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ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXVIII. No. 3299 FEBRUARY 14, 1941 SIXPENCE

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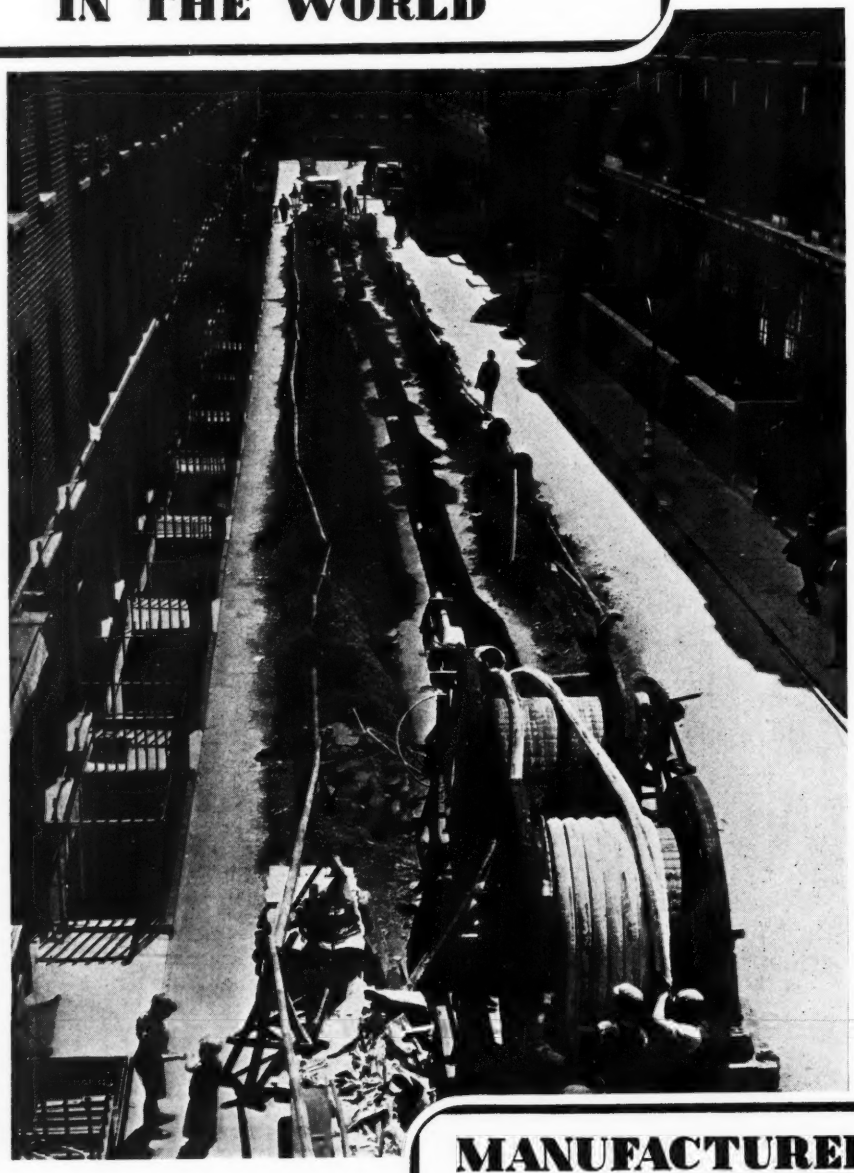

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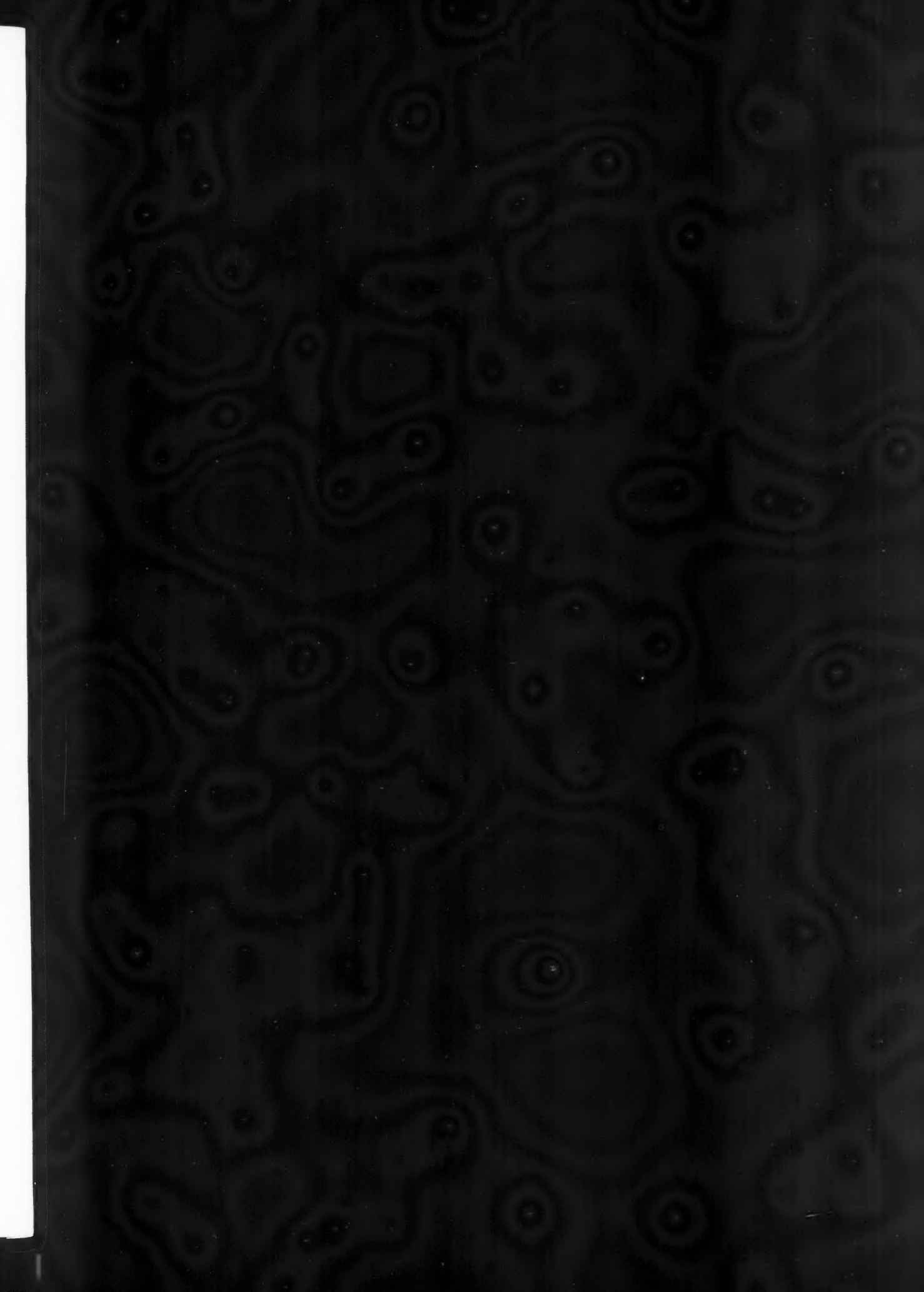

THE ELECTRICAL REVIEW

Volume CXXVIII **No. 3299**

Friday, February 14th, 1941

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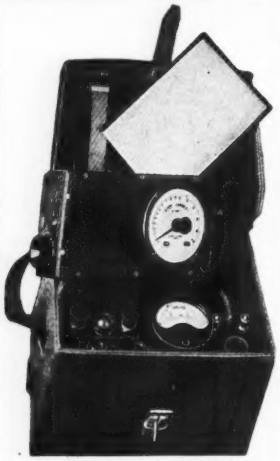

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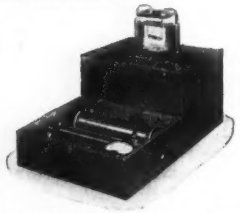

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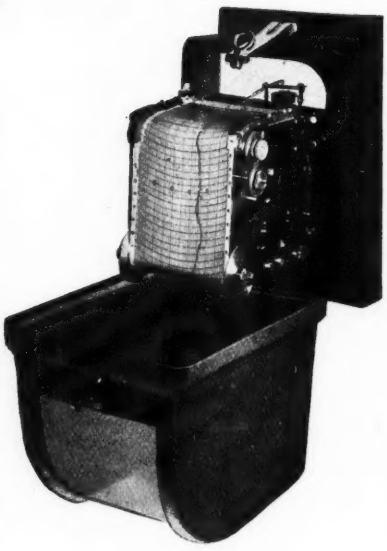

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THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXVIII. No. 3299 FEBRUARY 14, 1941 Price SIXPENCE

Manufacturers' Worries

A Plea to the Purchaser

THERE is no doubt that manufacturers are having a far from easy time nowadays. Hard pressed on every side, many of them are endeavouring to carry out a three-fold task—to contribute directly to the war effort, to satisfy essential civil needs and to produce goods for export.

Although they are thus called upon to accomplish much more than ever before, they are constantly faced with problems which did not exist in peacetime. The needs of the Services have deprived industry of much of its labour force and the substitutes have not yet settled down to their unfamiliar work. Materials are at a premium and sometimes almost impossible to obtain, while the demands upon the transport services give manufacturers yet another worry to contend with.

Yet, in spite of these many handicaps, their resourcefulness and ingenuity are enabling them to " deliver the goods " in ever-increasing quantities. We feel, therefore, that they are deserving of all the assistance which customers can give them—although customers have their troubles too. They themselves may be contractors or sub-contractors with a job which they cannot complete until the manufacturer lets them have some essential equipment, while their own customers are constantly pressing them to finish the work.

Priority Problems

A month or two ago a contributor to this journal had something to say about " priority," which is one of the wartime problems encountered by manufacturers. When practically all are on war work of one kind or another the system can easily be reduced to absurdity, as it was during the last war, when priority certificates fell as " thick as autumnal leaves that strow the brooks in Vallombrosa." It is seldom possible for the manufacturer to distinguish the very urgent from the less urgent in a batch of orders all bearing Government contract numbers and so he must let them take their proper turn, or, as our contributor suggested, satisfy a proportion of each customer's requirements in the hope that it will enable that customer to keep going.

It is natural for all engaged in Government work to consider that their particular activity is all-important, but it may be possible to extend delivery periods and thus give manufacturers a little breathing space. Orders should be placed as soon as possible, of course, but it is often feasible on an extended contract to plan ahead and place some orders well in advance of the time at which the supplies will be needed. This is asking a good deal, we know, for the truth is that everybody presses for the earliest possible delivery in order to secure a good footing, but it can be done.

Superfluous " Follow-ups "

A considerable amount of energy is being wasted every day by the staffs of national manufacturers which could usefully be diverted to better purposes. This waste is caused by thoughtless purchasers who, having placed an order for certain goods, immediately put into operation a routine " follow-up " system. Whilst manufacturers are forced to quote anything from six to eight weeks for delivery many customers religiously send letters or post-cards seven days after an order is placed, and at regular intervals afterwards, couched in terms which would lead the manufacturer to believe that the job in question is the only one which matters to the nation.

One switchgear manufacturer informs us that every morning over a hundred " follow-ups " arrive by post, each necessitating a considerable search of records to find the position of the order, and then the individual attention of a senior member of the staff in consultation with planning, production and despatch staffs, if the promise is to be worth the paper it is written on. It is quite usual to find delivery enquiries which take up the time of several employees for over an hour in the aggregate.

The war has now been in progress for about eighteen months and purchasers of any product should realise this and adapt their policy to the circumstances. Manufacturers have themselves anticipated the position by ordering well ahead, and in many cases where they can only get delivery of raw materials 26 to 30 weeks after placing their order are reducing the lag so that deliveries

of finished products are not more than four to six weeks behind the due date, except in rare instances. Therefore we repeat that all purchasers of electrical equipment can help the situation by placing orders at the earliest moment when particulars are available and giving the longest possible time for delivery, and then by refraining from " urging " until a short time before delivery is actually necessary or where knowledge of when the gear will be available is essential. A customer adopting this plan will receive every consideration from the manufacturer, and if it were universally adopted a considerable amount of labour now wasted upon superfluous clerical work could be transferred to the far more important job of getting material through the factories.

Technical Progress Committee

READERS may remember that in our issue of July 26th, 1940, Mr. E. A. Pinto suggested that a small joint committee of the Electrical Contractors' Association and the Association of Supervising Electrical Engineers should be set up to form the nucleus of a " Joint Technical Progress Committee " which would arrange papers, lectures, etc., at the branches of these Associations. The A.S.E.E. was interested in the proposal and referred it to the consideration of a panel of past-chairmen, as we reported at the time. The Association has now decided that such a committee would have to be national in character and would have to have the support of the Institution of Electrical Engineers. It is felt, however, that some of the bodies which would have to participate to make the scheme a success would hesitate to merge their identity in such a committee and that there would be objections to the formation of an additional body in the industry. Instead the A.S.E.E. is to extend an invitation to interested bodies to attend the regular meetings of the Association at which papers covering a wide range of subjects are read and discussed.

Purchase Tax Decisions

OUR sympathies go out to the Commissioners of Customs and Excise in their task of applying the Purchase Tax. Scarcely a day passes in which they have not to make a decision as to the liability to duty or otherwise of particular goods, and every new decision is as likely as not to create a new set of problems. A case in point is that relating to industrial lighting fittings. Unlike domestic fittings these are not liable to tax, but the question arises " What is an industrial fitting ? " The difficulty of giving a satisfactory definition is considerable, as there are so many borderline cases, but manufacturers feel themselves entitled to some sort of guidance. Judging from some of the recent decisions this is not to be wondered at, especially when it is remembered that there can be no appeal against them. To mention just one instance, a quite straightforward sheet-metal shade such as is commonly to be found in almost every factory has apparently been deemed taxable, either because it has a series of concentric ridges (not for decoration but to improve the efficiency) or because the exterior has been finished in an attractive pale blue instead of the customary black or grey. If all deviations from a strictly plain design are to be penalised, whether they make for improved efficiency and appearance or not and even though they are no more difficult or costly to produce, manufacturers should be told so without delay so that they can make their plans accordingly.

Smokeless Air

ALTHOUGH technical institutions and other associations may not be able to maintain their full activities in present circumstances, it is important that they should guard against the risk of extinction that would result from their ceasing to function temporarily. They will be needed hereafter. Smoke, although indicating waste of fuel and of labour in coping with its evils as well as injury to health, may not present a very urgent problem at the moment. Nevertheless, it will do so later, and the view expressed in the Eleventh Annual Report of the Council of the National Smoke Abatement Society (on which the I.E.E. is represented by Messrs. H. C. Lamb and C. D. Taite) is of general application. That is, it is not too early to prepare plans to fit in with the general pattern of post-war reconstruction in order that we may secure an acceptable peace.

Forced-Circulation Boilers

WHILE for some years past there has been a noticeable tendency on the Continent of Europe to regard high-pressure boilers of large evaporative capacity as coming more especially within the field of forced circulation, United States practice has definitely favoured natural circulation. In that country large high-head boilers up to the highest pressures in commercial use have, however, been built for natural circulation. It is, therefore, all the more significant to find the suggestion made from more than one quarter at the December convention of the American Society of Mechanical Engineers that the limits of natural circulation are being approached. This is to be expected when boilers of low height are under consideration, on account of the rapid diminution with increasing pressure of the difference between the specific heats of steam and water, upon which circulation depends. This re-opening of discussion on the subject is important as, in addition to the purely technical aspects, questions of savings in capital cost and in space are involved.

Fuse Standards

IT is one thing to decide upon a standard ; it is quite another to achieve interchangeability among the various makes, as has been shown by the controversies about socket outlets. Much the same difficulty is being found in the United States with regard to fuses. Under the new National Electric Code, which came into force there on November 1st, a special type of fuse (the " S " model) will be required in all new installations after twelve months from that date, though existing fuses may be retained. The new design is to be made in two ranges with several ratings in each, viz., from 0 to 15 A and from 16 to 30 A, and so constructed that a fuse of the heavier range cannot be used in the other. A committee has for nearly a year been endeavouring without result to secure agreement on details that would enable one manufacturer's fuse to be readily substituted for another's. As happens sometimes in Britain also, delays of this kind interfere with production and cause annoyance and expense to the public.

Modern Gravel Handling

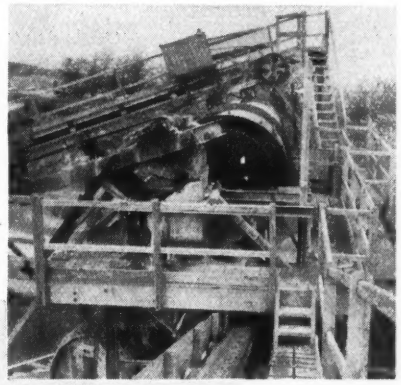
Electrical Methods Give Flexibility

Some excellent group sequence drives are a feature of the new installation in Derbyshire described in this article

BY courtesy of the Hulland Gravel Co., Ltd., we were recently able to inspect the new gravel handling plant at their quarries in Derbyshire, and our general impressions from the electrical viewpoint on leaving the installation related to the simplicity of the electric drives, particularly in respect of their outstanding contribution to the great flexibility of operation of the plant as a whole, to the practically automatic running of the system by virtue of remote control of all the motors from a central control station and, in consequence, to the labour saving effected.

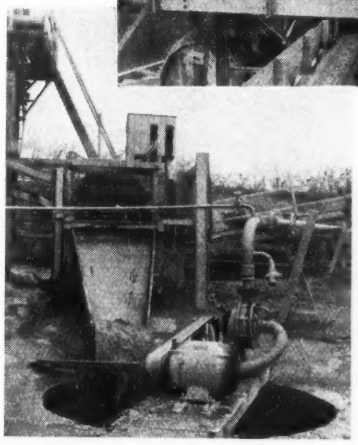
General view of the plant showing (left) conveyor to sand storage, (centre) washer and crusher, (right) cantilever screens over storage bins and (foreground) main feed conveyor and settling dams

Interlinking the main operations of washing, grading and crushing there is an extensive system of conveying and the essential continuous-flow principle in the design of the complete system has resulted in some excellent examples of group driving by means of which sequence operations are effected in the simplest but most efficient manner. Bearing in mind that, apart from the electrical control gear, every component of the plant operates out-of-doors in the fullest possible sense and that gravel handling is far from the cleanest of processes, we are sure that all will agree that the performances referred to reflect great credit on the Gravel Company and its engineers and contractors.



The rotary washer and screens mounted at the main feeding conveyor about 40 ft. above ground level

Like the older installation, the new plant was designed for an input capacity of 40 tons per hour, but it has already been proved to have a considerable overload margin and many improvements, particularly with regard to the remote electrical control, are responsible for greater efficiency of operation. It is a Goodwin, Barsby plant and all the motors, many of which are mounted about the intricate structure in positions and at angles which the casual observer might be excused for describing as precarious, are slip-ring totally enclosed, fan-cooled machines supplied by Lancashire Dynamo & Crypto, Ltd. Centralised control for all the motors from a station at ground level, not only contributes directly to the high efficiency of the actual running of the plant, but it must help greatly from the maintenance point of view not to have the controls and switches located with the motors in the very exposed positions on the various stagings.



Dirty water from the dewaterer in rear flows into the sump in the foreground and is pumped to the settling dams

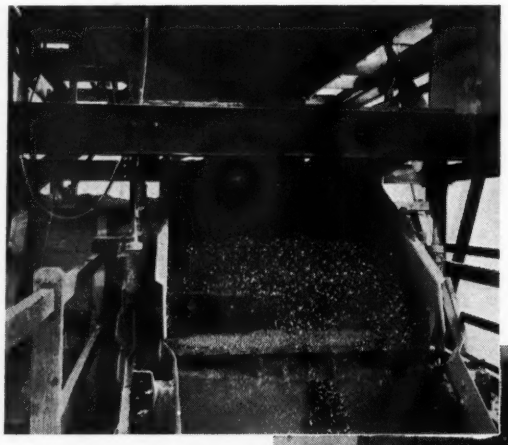
The control board at this station is a very sound and neat equipment supplied by George Ellison, Ltd. It consists essentially of a metal-clad busbar chamber on the front of which is mounted a line of oil circuit-breakers, one for each motor. Horizontal draw-out isolation is provided for this 440-V gear by a system of plug and socket connections on the switches and busbars, respectively, the operation being effected by means of a screw thread on the side of each switch. Further, the whole switch unit may be withdrawn completely from the chamber for examination, and a door is readily available to close the necessary aperture in the chamber front when this is done. All motors of up to 5 HP are started direct-on by the oil circuit-breakers, while the larger motors have rotor resistance control by drum-type starters. Each starter is floor-mounted immediately in front of its corresponding switch.

The ballast is won by quarrying operations in which Diesel-driven mechanical navvies play an outstanding part. The stone and sand content of the ballast vary in different parts of the quarry, but, whatever their proportions, the desired separations are effected by the washing and screening operations on the handling plant proper.

Lorries tip their loads of ballast into a 6-cu. yard feeding hopper below ground level and from this hopper the material falls on to a 30-in. caterpillar feeder which serves an 18-in. endless belt conveyor with 120-ft. centres and inclined to 1 in 20. The conveyor drive is at the top end where a 15-HP motor runs at 960 RPM with simple V-belt transmission to the first

conveyor pulley with an 8 to 1 speed reduction. The caterpillar feeder at the bottom is driven from the far-end conveyor pulley shaft, first by chain to a counter shaft, then *via* a 12 to 1 reduction gear and finally on to a fast and loose pulley on the feeder shaft. The rate of feeding from the hopper is regulated by a plate which varies the size of the feed aperture. Hand picking from the belt for foreign matter is employed at a station a little way up the incline.

In a hopper into which the ballast falls at the top of the conveyor the material receives its first introduction to water by sprays and the mixture is chute fed into a three-stage contra-flow horizontal cylindrical washer into which water and the mixture flow in opposite directions. This washer, which is about 18 ft. long, revolves on rubber trunnions and is driven by a 17-HP motor with transmission first by an 8 to 1 speed reduction V-belt to a shaft from which there is a 2 to 1 bevel-gear reduction drive to a sprocket wheel serving a wide-link chain which engages with gearing round the outer periphery of the cylinder. Fins on the inner periphery of the washer screw feed the mixture along to screens which are really an extension of and revolve with the washer.



The magnetic vibrating screen (electro-magnet shown on left) is served by a self-contained m.g. set in the remote control station

Sand and dirty water which pass these screens are carried down to a " Flight Type," dewaterer, a trough-like structure in which an endless conveyor with crosswise " drags " removes the sand from the bottom on the scraper-dredger principle. The dewaterer unit has a V-belt drive from an 8-HP motor. The sand drawn up the sloping end of the dewaterer is delivered on to a 16-in. inclined belt conveyor, with 130-ft. centres, from which the sand falls to the storage ground, either from the end or at selected tipping points along the line. Like the dewaterer, this conveyor will handle 20 tons of sand per hour and it is driven by a 6-HP motor through a V-belt to a countershaft and then by means of chain gear.

Dirty water passes over a weir at the other end of the dewaterer into a sump from which it is pumped away to dammed settling ponds from which, after the settling, the clean water is returned to a central concrete reservoir for recirculation. The pump which conveys the dirty water from the sump to the settling ponds is driven by a 10-HP, 1,450-RPM motor *via* a one-to-one ratio belt transmission, while in the pipe line to the plant sprays there is a directly-coupled 10-HP motor-driven turbine pump. Each of these pumps will deliver about 10,000 gallons of water per hour.

The radial conveyor deposits the stone on the stocking ground round the clean-water reservoir

Stone from the washer screens is chute fed to a rotary crusher from which the broken material is belt-conveyer fed up to the washer level again. Thence it falls on to a screening grid from which the rejects are returned to the crusher. This is driven by a 30-HP motor installed at ground level and first transmitting power to a countershaft from which there are secondary transmissions to the return conveyors associated with the crusher plant which will handle about 30 tons of stone per hour. Material from the crushing section is next transported on a 16-in. inclined conveyor with about 62-ft. centres from which is fed a double-shell cantilever screen in which the stone is further treated with water. An 11-HP motor serves both the cantilever screen and the inclined belt feeding it. The two larger sizes of stone from this screen are passed direct to their respective storage bins, while the $\frac{1}{2}$-in. stone is delivered direct on to a double-deck magnetic vibrating screen. This equipment is operated by electro-magnets fitted at either side of the inclined mesh table, and the necessary DC supply for these magnets is furnished by means of a small motor-generator set housed in the remote-control station. The m.g. set is self-contained with the necessary control gear and circuit interrupting system for the magnets.

Centralised control from this board for all the motors contributes to high running efficiency and helps considerably in maintenance

The rejects from the top and bottom meshes of the vibrating screen are passed direct to appropriate storage bins, while the fines from the lower mesh, with additional water sprayed on the vibrating screen, are passed on to the dewaterer already described where they unite with the sand from the contra-flow washer.

The storage bins, which have a total capacity of 200 tons, are suitably elevated for direct downward chute feeding to lorries underneath, but for stocking purposes there are trap chutes at one side of the bins, any of which can serve, as required, a 16-in. belt conveyor with about 100-ft. centres for transport to the stocking ground

via a radial conveyor which delivers to storage piles round a circle described by the 50-ft. arm of the radial conveyor. Actually this stocking circle is around the clean-water reservoir, the circular concrete wall of which provides a convenient run-way for the wheeled supporting carriage for the upper end of the inclined conveyor. The lower and swivelled end of the same conveyor is carried on a steel structure rising out of the centre of the reservoir. The radial conveyor structure is hand pushed round the reservoir, but the belt proper is driven by a 5-HP motor, with simple flat-belt transmission, mounted on the radial arm structure. The necessary flexibility for the motor circuit at the swivel end is provided for without the usual broken-circuit and sliding connector arrangement, a loose armoured flexible cable giving entire satisfaction.

The flat conveyor from the bins to the radial conveyor is also driven by a 5-HP motor with V-belt transmission. For supplying the necessary clean make-up water to the reservoir there is at a point about 100 yards from the plant a pumping station equipped with a 10-HP motor-driven pump which is capable of delivering 7,000 gallons of water per hour.

Electricity is received from the 11-kV system of the Derbyshire & Nottinghamshire Electric Power Co. at a substation on site where it is transformed to 440-V 3 phase—the power distribution and utility conditions throughout the works. A simple metal-clad board with Ellison industrial oil circuit-breakers governs the main works transmission, but as the remote-control station is, in effect, the distribution centre for the new handling plant described, one trunk cable to this point is sufficient. Distribution to the motors from the remote-control station is by armoured cables cleated to the plant structure. High power factor for the whole works is maintained by means of a 50-kVA B.I.C. condenser installed at the supply point.

Our thanks are due to Mr. E. Wheatcroft, works manager, and to Mr. S. Kirkland, works foreman, for their help in collecting the above information.

PERSONAL and SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

WE mentioned last week that **Mr. E. S. Saunders,** district officer, Surbiton, and area engineer to the London and Home Counties Joint Electricity Authority, had retired. Mr. Saunders was born in India in 1876. He was at Dulwich College from 1887 to 1893 and then proceeded to the Central Technical College, South Kensington, which he left in 1896 to become an apprentice with Crompton & Co., Chelmsford. In 1899 he was appointed electrical superintendent at Bradford and was then at the British Westinghouse Co.'s London office from 1901 to 1904. In the latter year he went to the Dowlais works of Guest, Keen and Nettlefolds where he stayed until 1907. For the next three years he was with Siemens Bros. & Co. at Sheffield and then, from 1910 to 1915, acted as general manager for the company in India, Burma and Ceylon. During the last war he served with the R.A.F. and he was awarded the O.B.E. Mr. Saunders is a member of the Institution of Electrical Engineers.

Mr. C. H. Woodward

Mr. C. H. Woodward, electrical and public lighting engineer to the Bournemouth Corporation, has retired after forty-one years' service. Mr. Woodward was president of the Association of Public Lighting Engineers at its conference held in Bournemouth in 1938. He is an associate member of the I.E.E.

The chair of Electrical Engineering in the University of Birmingham, vacated by the resignation of **Prof. B. L. Goodlet,** who is returning to South Africa, has been filled by the appointment of **Dr. C. Dannatt.** Dr. Dannatt received his technical education at Armstrong College, Newcastle, under Prof. W. M. Thornton, D.Sc., O.B.E. His studies were interrupted by the last war, during which he served in the York and Lancaster Regiment, attaining the rank of captain and being awarded the Military Cross at Messines Ridge in 1917. After the Armistice he resumed his studies at Armstrong College, graduating from there in electrical engineering in 1921. Whilst at the University he was a Scholar of his College.

Dr. Dannatt joined the Electrical and Magnetic Section of the Research Department of Metropolitan-Vickers Electrical Co., Ltd., in 1922, taking charge of the section in 1924. His activities have been mainly concerned with engineering investigations, and he is a recognised authority on electrical measurements, especially in relation to magnetism and the behaviour of dielectrics. He has taken an active part on several committees of the ElectricalResearch Association; he is the author of numerous articles and papers to scientific and engineering societies, and is principal author of "Electrical Power Transmission and Interconnection." In 1936 he was awarded the degree of D.Sc. by the University of Durham. In the 1938-39 session Dr. Dannatt was part-time lecturer in electrical engineering at Queen Mary College, University of London. He is a member of the Institute of Electrical Engineers.

Dr. C. Dannatt

Dr. Dannatt is engaged on work of national importance and will not be able to devote full time to University activities for the present, but a satisfactory allocation of time as between the University and the company has been agreed upon.

There was a record attendance at last Friday's lunch of the Electrical Trades Commercial Travellers' Association, nearly three hundred members and their friends being present, almost a hundred more than last year—a remarkable achievement in the present circumstances. **Mr. P. E. Wheatland,** who has the distinction of being chairman for the second year in succession, presided. Proposing the toast of the Association, **Mr. C. R. Westlake,** electrical engineer and manager of Finchley Corporation Electricity Department, congratulated its members on the prosperous state of its affairs and related humorously his own experiences in dealing with manufacturers' representatives. In response, the president, **Mr. T. W. Heather,** praised the fine work being carried out by electricity supply undertakings in the present difficult conditions and expressed his surprise at the amount of damage electric cables could stand and also the rapidity with which they were repaired. There had been many critics of the grid, but it could not be denied that it had been justified and the country was greatly indebted to those who were responsible for its establishment. On land, sea and in the air electrical equipment was helping to carry us on to victory.

Mr. H. S. Pocock, managing director of the ELECTRICAL REVIEW, who replied to the toast of the guests, expressed his pleasure at the excellent attendance and said he was surprised that the Association could in fact carry on at all. Its members were called on to practise what might be termed "inverse salesmanship," inducing their customers to reduce their purchases and postpone delivery dates. If in these circumstances they could maintain good-will until better times returned they were doing their bit in the war. **Mr. J. N. Stephens,** the vice-president, and **Mr. J. D. Reddy,** the vice-chairman, also spoke. A collection for the Association's benevolent fund realised £70.

Mr. H. L. Mills, engineer to the Stoke-on-Trent Electricity Supply Department, was due to retire on superannuation shortly but upon the recommendation of the Electricity Committee the City Council has extended his period of service by twelve months.

Mr. L. Goodall, of the Stoke-on-Trent Electricity Supply Department, has been designated engineering assistant.

Mr. H. A. Sieveking, M.Sc. (Eng.) London, A.M.Inst.C.E. (Joule Medallist), A.M.I.E.E., Barrister-at-Law (Middle Temple), has resigned from the position of assistant engineer with the Central Electricity Board to take up the appointment of personal assistant to Mr. Ulander, director of James Howden & Co., at 195, Scotland Street, Glasgow. Mr. Sieveking was apprenticed to the B.T.H. Co., at Rugby in 1925, and entered the company's Switchgear Department in 1928, leaving them to study hydro-electric practice in Germany. He joined the C.E.B. in 1933.

Mr. H. A. Sieveking

Mr. A. E. McColl, manager for Scotland, Central Electricity Board, has been nominated as chairman of the Scottish Centre of the Institution of Electrical Engineers.

Lt.-Col. H. W. Watts, M.I.E.E., M.I.Mech.E., borough electrical engineer of Epsom and Ewell, is retiring on March 8th. Col. Watts received his technical education at the City and Guilds Institute and Finsbury College, London, and served his apprenticeship with James Swinburne & Co., and Simpson Strickland & Co. After a varied experience with a number of electricity supply authorities he was appointed, in 1899, as chief engineer and manager to the Alderley and Wilmslow Electric Supply Co., where he erected and managed the works. Two years later he joined the Urban Electric Supply Co., as chief engineer and manager of the Weybridge, Walton-on-Thames and Hersham electricity works. In the last war he saw service both in India (where he attained the rank of temporary lieut.-col.) and in this country. In 1919 he again went to India where he held concurrently the appointments of acting civil engineer assistant to the Director of Ordnance Factories, India, resident engineer for the new Ishapore power station, consulting engineer for the gun and shell factory at Cossipore, and industrial engineer to the Government of Madras. Col. Watts returned to this country in 1922 and after a number of temporary appointments became resident electrical engineer to the Epsom U.D.C. in 1925 and when Epsom was created a borough, was appointed its first borough electrical engineer.

Lt.-Col. H. W. Watts

Obituary

Capt. David Euan Wallace, M.C., M.P. whose death occurred on February 9th, at the age of forty-eight, had occupied a number of Government positions. He became known to the electrical industry as Minister of Transport in 1939, a post which he held for a year before becoming Senior Regional Commissioner for Civil Defence in London. Earlier, as Parliamentary Secretary to the Board of Trade and Secretary to the Department of Overseas Trade he had had contacts with industry, particularly in connection with the British Industries Fair.

Mr. G. E. Gittins.—In the course of an appreciation of the late Mr. G. E. Gittins, whose death was reported in our last issue, "V. W." says:—

"Those of us who had the pleasure of coming in contact with Mr. Gittins during the many years he was associated with the Metropolitan-Vickers Electrical Co., Ltd., were deeply shocked to hear of his death last month. We knew he was not enjoying the best of health, but we were looking forward to his return, full of vigour and zest. He was a fearless and outspoken critic and it was an education to hear him when he was roused. Yet in spite of this he never made an enemy owing to his evident sincerity and also to his unfailing sense of humour.

"We shall miss him greatly and in the hearts of the older generation, his place can never be taken by anyone else. The meetings he attended will seem duller, and the absence of that sonorous voice will leave a void which we shall only realise fully in the days to come."

Mr. D. P. Dunne, whose death on January 31st we announced in our last issue, died suddenly at a Manchester hotel. He had been ill since November and was making good progress at the private patients' home attached to the Manchester Royal Infirmary so that it was possible for him to be moved. Recently, however, his illness had taken a graver turn. Mr. Dunne joined the Chloride Electrical Storage Co., Ltd. as secretary in 1902 and played an important part in the growth and development of the company. He became a director in 1922 and for a number of years had been managing director. He was sixty-five years of age and until some three months ago had led an active life and was a prominent figure in the storage battery industry.

The late Mr. D. P. Dunne

Will.—Mr. A. T. Reid, managing director of the North British Locomotive Co., left personal estate in Great Britain of £272,885.

Electrical Engineer Appointed Archdeacon

An Active and Varied Career

WE briefly announced in our last issue that the Reverend C. J. Grimes, A.M.I.E.E., had been appointed Archdeacon of Northampton and Canon-residentiary of Peterborough Cathedral. Archdeacon Grimes has now kindly sent us a photograph (reproduced herewith) and some notes on his career.

He was educated at Stratford-on-Avon and at the City and Guilds College, London. After two years of civil engineering he joined Siemens Bros. & Co., Woolwich, and passed through the works and drawing office. In 1903 he was appointed to the staff of Preece & Cardew and from 1904 to 1907 was one of their resident engineers at Devonport Dockyard. He then went to India as assistant engineer to the Commissioners for the Port of Calcutta, where one of his colleagues was Mr. George Hubback who later became Bishop of Assam. He joined the Institution of Electrical Engineers in 1908.

The Ven. C. J. Grimes, A.M.I.E.E., Archdeacon of Northampton

In 1910 Mr. Grimes decided to take Holy Orders, and after a period at Cuddesden College, Oxford, was ordained deacon in 1912 and priest the following year. For three years he was curate at St. Giles, Reading, and then returned to India as a chaplain on the Indian Ecclesiastical Establishment, being first at the Cathedral Church of St. John, Calcutta, and later Garrison Chaplain at Fort William.

During the last war, when there was a shortage of engineer officers for the Mesopotamian Expeditionary Force, Mr. Grimes was allowed by his bishop to take a commission and after serving as Deputy Assistant Director and, later, Assistant Director of Military Works, he retired with the rank of major.

From 1919 to 1924 he was again a chaplain in Calcutta and then returned home to take up the living of St. Matthew, Westminster. In the following year, however, he again went back to India as Archdeacon of Calcutta at the time of the disestablishment of the Church of India. In 1933 he accepted the living of St. John, Peterborough, and then in 1938 became rector of Thorpe Malsor, Kettering. Mr. Grimes was made a non-residentiary Canon of Peterborough in 1937. He tells us that he expects to take up his new duties at Peterborough after Easter.

Archdeacon Grimes in his letter to us says:—"I expect you, like so many others, think it strange for an engineer to become a parson. In fact, it is not, for the relationship between science—more particularly electrical science—and eternal verities is very close. It is only the bad scientists and unimaginative theologians who think otherwise!"

Mid-Southern Utility Bill

AMONG the Private Bills which are being promoted in Parliament this Session is the Mid-Southern Utility Bill, originating in the House of Lords, seeking authority for an increase of capital. The company asks to be allowed to issue from time to time further ordinary or preference stock to such nominal amount as shall be sufficient to produce after taking into account any premiums or discounts and allowing for expenses of issue the sum of £737,370. All share capital so to be issued will be offered for sale by public auction or tender subject to a reserve price which is to be notified to the Board of Trade. Provision is made for a proportion not exceeding one-fourth of any future issue of share capital to be reserved for exclusive offer to the company's consumers or employees at a price not below the reserve price. The company also seeks power to borrow on mortgage of the undertaking in respect of share capital already issued £919,300 and in respect of any future issue of share capital up to 75 per cent. of such issue. The powers of borrowing or raising capital are not to be exercised without the consent of the Treasury.

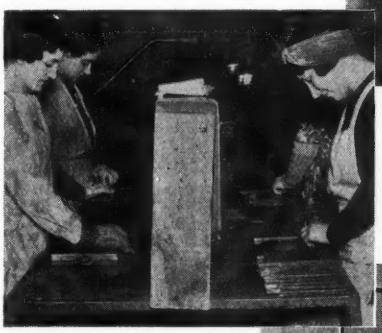
A number of local government authorities in the company's area have decided to join in a petition opposing the Bill.

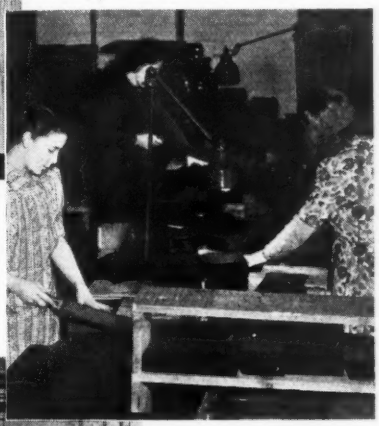
Traction Batteries

Meeting the Increased Demand for Vehicle Units

TO meet the increased demand for batteries for electrically-propelled vehicles, the Young Accumulator Co. has completed an extension to its factory, adding approximately 50 per cent. to the available floor area. This expansion is especially remarkable in view of the slowing down of business in car starter batteries, and it reflects the confidence of the company in the future of battery vehicles.

The new section of the factory, which, like the rest, is a single-storey erection, consists of five large bays. These will be used respectively for the ebonite armouring of plates; laboratories, testing and traction service; traction battery assembly and charging; formation; and stores. The additional space available permits a general expansion of all other departments in the old section of the works.

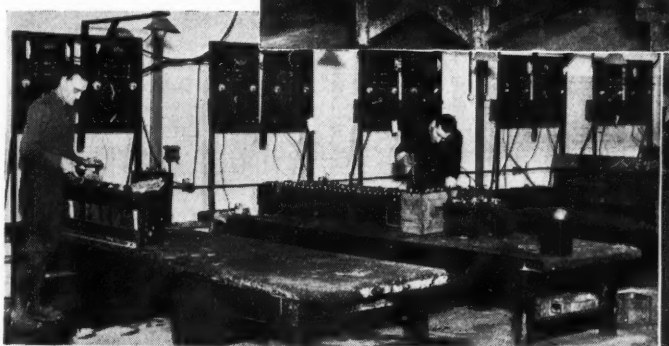


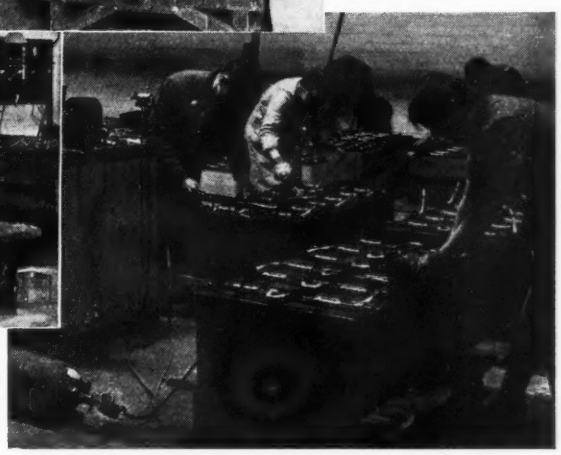


Above: Spreading the powdered rubber preparatory to pressing out the separators. Right: Trimming, cutting and examining the separators. Left: Armouring the positive plates. Below: One of the formation rooms

The electric traction battery is vastly different in detailed construction from motor car units, being specially designed to cope with the strenuous conditions which it will meet during its life. The plate grids are cast from antimonial lead and trimmed and cleaned in the normal way. They are then passed to the pasting shop for filling by hand with the special mixtures of oxides which have been developed through years of experience of electric traction work. The plates are then passed through seasoning and drying chambers to the formation department where they are placed in tanks containing sulphuric acid. A direct current of electricity is passed through them for a predetermined length of time which transforms the raw materials into active materials. The plates are dried after this formation and are ready for use in the batteries.

The "Porbonite" separators are made from a rubber-sulphur mixture. The basic mixture is masticated and mixed on rolling-mills and then completely vulcanised. This vulcanised mixture is ground into a powder and further mixed to the required composition. The material is then fed into aluminium moulds along with perforated ebonite sheets which are combined with the porous material by further vulcanisation. The sheets are afterwards cut to the necessary sizes to form the separators in the batteries. The porosity of the "Porbonite" material is approximately 50 per cent.; the structure does not present a straight path through the separator and short-circuiting by particles of material between the plates is impossible.





A section of the charging room and (right) assembling a batch of batteries

Enveloping of the positive plates is especially interesting and a new method has just been introduced which takes only about half the time of that previously employed. A special rubber strip is used for sealing and this is mixed and vulcanised in one corner of the armouring section. The process consists of placing in a frame consecutively a separator, a sheet of glass silk (for breaking up the bubbles of gas which form on charge) and the plate itself. The rubber strip is fed round the outside, and a further sheet of glass silk and another separator are then added. The whole assembly is pressed and vulcanised in the special vulcanising presses. This forms a complete sealed envelope and as the rubber strip used stays soft after vulcanising, it protects the plate from vibration shocks. After trimming, the plate goes to stores ready for assembly.

Pasting the plates

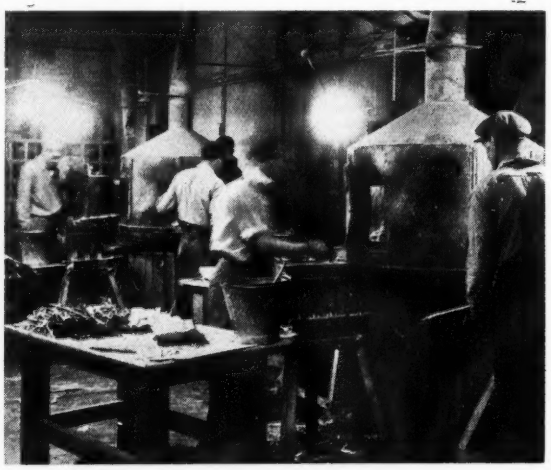
The new armouring section is at the moment equipped with four presses, but space has been left for four more. The old armouring section is being taken over by the carpenters for wood case, etc., manufacturing, the old carpenters' shop in its turn being divided and used as extensions of the tool shop.

Assembly consists of feeding the positive and negative plates separately into jigs to hold them in position to receive the pillar which is cast on, thus forming one homogeneous mass of pillar and plates. The positive and negative plates are then married together and wood separators added, in addition, of course, to the separators incorporated in the armouring. Grooves in the separators permit the acid to pass freely up the front of the positive plates during the whole life of the battery. The element is then slipped into boxes and the lid put on, together with the collars.

In the test room, batteries are subjected to conditions as near as possible identical to those encountered on the road. They receive an 8-hour charge and 4-hour discharge alternately, a time-switch being used for change-over purposes, while to simulate the vibration normally received, a specially designed "bumping" apparatus is used.

Four standard sizes of traction batteries are now made by the company, having capacities per positive plate of 40, 27, 20 and 16 Ah at the five-hour rate. The type used mainly for battery vehicles is the 27 Ah, the smallest units being favoured for electric prams.

Our thanks are due to the company for permission to describe its works and processes and also to Messrs. A. H. Shaw (sales director) S. J. Clark (works manager) and C. T. Climpson (assistant sales manager) for their assistance in preparing this article.



Casting the grids

Circumventing Raid Damage

A LARGE share of the brunt of keeping the supply going in London is being borne (not without casualties) by the men of Central London Electricity, Ltd., who were congratulated by the Duke of Kent on their magnificent work when he visited a C.L.E. substation recently.

It has been found that the force exerted by blast is usually insufficient to injure a cable, in view of its great mechanical strength in relation to its size and its flexibility. Only when the cable has been actually struck by a bomb or splinter or by some displaced heavy object is damage done as a rule. Cables have frequently remained in service strung across craters, particularly when these are in soft ground, even when damaged.

An illustration of this has been afforded by the complete severance of wire-armoured cable laid through a manhole which was wrecked by a bomb, whereas a pair of lead-covered high-voltage cables immediately adjacent in soft ground in the middle of the crater were unharmed. Another example is provided by a high-voltage cable taken above ground to enter the wall of a building, which was cut by a concrete fragment thrown from a bomb hole in a roadway about 60 ft. away. Once a bomb fell on a duct containing thirty cables, including high-voltage feeders; although many were badly twisted, not one broke down.

Discrimination must be exercised in deciding what repairs are really necessary, as, while some cables though strained may not need to be cut (especially if exposed to view), others may have been damaged and their lead sheaths broken. In that event they should be cut and sealed off as quickly as possible to prevent the entry of moisture, which has been known to travel as much as 60 ft. up a cable within a few hours. Before rejointing a cable a moisture test should be taken at the ends on each side of the crater.

In the centre of London cables are generally drawn into conduits, which has the disadvantages in present circumstances that the conduits have to be repaired as well as the cables and that pits or boxes may have to be inserted, increasing the time and cost of repairs. Temporary repairs are usually necessary in the first place in order to restore supplies or maintain standby, leaving permanent repairs until the site has been cleared and the sewage and other services have been made good.

Before the war it was generally anticipated that a crater would be by-passed by inserting a new cable jointed on each side and laid round the crater on the ground surface or supported on railings or buildings. In most cases, however, it has usually been possible to lay the new cable in its permanent position across the crater, but temporarily supported until the crater has been filled. The simplest method, that of drawing the new lengths through pipes across the crater, entails the use of valuable steel, which remains incorporated in the final system. A bridge of steel scaffolding, which can be adapted to almost any shape or purpose, represents a more practicable alternative. Another way is to strap the cables to a scaffold pole laid across a small crater. Exposed cables should be protected by boards from flying fragments. Access to the service cable on bombed or burnt out premises is not always feasible owing to debris, which sometimes entails cutting the main on each side of the fault.

Damage to transformer chambers has occurred due to flooding and also to bombs exploding on near-by cable runs pulling the cables so violently that the associated switchgear has been ripped asunder, breaking isolating switches, busbar chambers and cable boxes.

There have been no cases of incorrect operation of even the more delicate relays because of near-by bombs although, when the building itself has been hit, the concussion has occasionally caused some relay or switch to trip. Substation attendants have shown great proficiency in dealing with incendiary bombs and in preventing the spread of fire from other buildings to their own.

Insulating Materials

Recent Developments in Synthetic Products

By J. F. Gillies, Ph.D., B.Sc., A.M.I.E.E.

Dr. J. E. Gillies is at Belfast College of Technology

THE introduction of synthetic insulating materials, as distinct from rubber, mica and similar natural insulators, has extended greatly the range of insulators available to the electrical engineer and has enabled him to choose the material which is most suitable for a given purpose as regards both mechanical and electrical properties. Intensive research into the production of organic compounds suitable for moulding into definite shapes has resulted in the commercial development of a wide variety of new materials. Among these are several with mechanical and electrical characteristics which render them superior to the natural insulating materials for many purposes.

Research on the chlorination of hydrocarbons has resulted in the production of non-inflammable oils and waxes which, although limited in useful scope at present, may become increasingly important. A further important development has been the discovery of a series of ceramic products possessing properties which make them better than any other insulators for use at high frequencies. The data given in the table indicate the electrical properties at room temperature of a representative number of synthetic insulators together with the properties of a number of natural insulators which are included for the sake of comparison. The figures given have been selected from various sources and must be regarded as approximate on account of the variations likely to occur from sample to sample and from the conditions under which the measurements are made.

As a result of recent British research the electrical engineer has at his disposal new synthetic insulating materials possessing mechanical and electrical properties to meet every requirement

Properties of Insulating Materials

Material	Permittivity	Percentage power factor at 10n cycles per sec.	n	Breakdown value kV per mm.
Ebonite ..	3.0	0.6	3	150
Bakelite .. (wood-filled)	5.0	5.0	2	10
Mica	7.0	0.03	3	50
Trolitul ..	2.5	0.03	6	30
Transformer oil	2.2	0.01	3	—
Permitol ..	5.0 (102 cycles per sec.)	0.1	2	—
	2.8 (106 cycles per sec.)	5.0	6	—
Porcelain ..	5.5	0.8	6	25
Fused quartz	3.8	0.02	6	20
Frequentite ..	6.0	0.05	6	25
Faradex ..	80	0.04	6	10

The development of the plastics industry dates from the discovery by Baekeland, some thirty years ago, of an industrial process for the production of phenol formaldehyde, familiar under the trade name of "Bakelite." This is formed by the interaction of phenol and formaldehyde and it has been followed more recently by a number of similar compounds, of which urea formaldehyde, known as "Beetleware," is the most useful for electrical purposes. Glycerol phthalate, although different in constitution, has similar properties and is the basis of "Glyptal."

These materials all belong to the group of plastics known as thermo-hardening, that is, they are produced in the form of a powder which, when pressed into a mould and heated, hardens to a solid mass which does not soften again on further heating. Generally the moulding powder contains a quantity of wood-flour or other "filler" and colouring matter may also be added. The powder may be dissolved in a suitable solvent forming an impregnating varnish, of which "Novolak" is an example, such varnishes having the advantage that after baking, they will not soften again. In addition, they are resistant to the effects of oil and water. Similarly micanite bonded with Glyptal instead of shellac retains its form after baking, even if it is again heated.

Electrically, the properties of the thermo-hardening plastics are not outstanding. They have a somewhat low breakdown strength, although it is adequate for most purposes, and they have a high dielectric loss which, at high frequencies, causes over-heating and charring. Their use is therefore confined to power frequencies, being usually combined with paper in laminated cylinders or sheets, or used in the moulded form for meter cases, terminal blocks or instrument panels. When used in air, urea formaldehyde has the advantage that breakdown across its surface does not produce "tracking" and blistering, as in the case of phenol formaldehyde. It has also the advantage that it can be produced in light colours.

Of more interest electrically are the thermo-plastic materials, that is, materials which soften on heating but harden again on cooling. These materials are formed by the polymerisation or linking up of simple molecules into long chains which may consist of some thousands of these molecules. At ordinary temperatures, the long chains are intertwined and form a rigid solid, but a rise in temperature allows some slipping to occur between the molecules so that the material passes gradually into the liquid form.

Polystyrene, known commercially as "Trolitul" or as "Distrene," is an example of such a material. At ordinary temperatures, it is a transparent, glassy solid but it commences to soften at about 140 deg. F. It can be machined if care is taken to avoid overheating, and the powdered form can be moulded with ease in heated dies to form parts of intricate shape. It has excellent electrical properties and, even at very high frequencies, the dielectric loss or heating effect is extremely small. Consequently polystyrene finds a wide and very important application as an insulator for use at high frequencies, as, for instance, in the insulation of co-axial cables for television and communication purposes. It can also be produced in the form of fibres which can be spun into threads and used for high-frequency cable insulation.

A further thermo-plastic material, which may have important electrical applications, is found in the vinyl resins which are composed of various polyvinyl derivatives, such as the chloride, acetate and formaldehyde. Some of these have a resemblance to rubber, which makes them suitable for coating wire with an insulating covering. When used for this purpose, the compound is heated until it becomes a viscous liquid which can be applied to the wire by a floating die. The coating is claimed to be more flexible, to age better and to be thinner than the coating on standard enamelled wire.

Rubber Substitutes

Recent years have seen active research in several countries into the production of a synthetic substitute for rubber. Butadiene is such a product and is the basis of the German "Buna" rubbers, which consist either of simple polymers of butadiene or of co-polymers of butadiene and styrene or butadiene and acrylic nitride. These compounds can be vulcanised by mixing with sulphur and heating, in a fashion similar to the production of vulcanised rubber. The substitute appears to be superior to natural rubber in some respects, for instance, as regards resistance to heat and to abrasion. Some forms show a marked resistance to the action of petrol and mineral oils, but, in general, the insulation resistance is less than that of natural rubber. In spite of this, it is a valuable substitute for rubber in the manufacture of rubber-insulated cables, as well as replacing rubber in many of its other uses.

As is common in organic compounds, the incorporation of chlorine atoms in the butadiene molecule diminishes the inflammability to a marked extent. The compound "Neoprene" is obtained by substituting chlorine atoms for two of the hydrogen atoms and is used in the manufacture of fire-resistant cables. As its insulation resistance is inferior to that of normal vulcanised rubber, the practice has been developed of applying the insulation

in two layers, the inner layer being natural rubber while the outer layer is composed of this fire-resistant artificial rubber. Both layers are then vulcanised together. A sample of house-wiring cable insulated in this way, after being held in a flame for 60 seconds, continues to burn for a period of only 20 seconds or less and damage is confined to a few inches on either side of the part exposed to the flame. Ordinary vulcanised-rubber cable subjected to similar treatment would continue to burn furiously.

Transformer Oils

A somewhat similar development has led to the introduction of non-inflammable transformer oils. Chlorinated diphenyl is obtained by substituting chlorine atoms for some of the hydrogen atoms in the diphenyl molecule, with the result that it is non-inflammable. In the forms known as "Permitol" or "Pyranol," it has characteristics similar to those of ordinary transformer oil and has obvious applications for use in transformers situated in positions where it is essential that the fire risk should be reduced to a minimum. It is chemically stable and shows a resistance to sludge and acid formation similar to that of a high-grade oil. On account of the comparatively high cost of the non-inflammable oil, it is desirable that the volume of the transformer tank should be reduced as much as possible when it is used.

In this connection, the high dielectric constant, which is about the same as that of bakelite, may enable a more compact structure to be obtained by making it possible to reduce the amount of major insulation on account of the more even distribution of electrical stress over the bakelite and the oil. As it is denser than water, there is a tendency for a water film to form on top of the oil and so, to prevent breakdown across the surface, bare connections should not be brought through the surface of the oil. A further disadvantage is that the oil becomes viscous at temperatures approaching 32 deg. F., although it is very fluid at a temperature of 120 deg. F., so that it is unsuitable for use in positions where the ambient temperature may fall to a value approaching the freezing point. As breakdown or arcing in the oil results in the formation of hydrochloric acid and the liberation of chlorine, it seems that the oil is unsuitable for use in switchgear where arcing is a normal occurrence.

Chlerine substitution has also been used to produce from naphthalene a chlorinated naphthalene which is a non-inflammable wax. It is resistant to the action of oil and other organic solvents but is found to be inferior to paraffin wax in electrical properties.

A development of the highest importance to the radio engineer has been the discovery that certain ceramic materials have unusual electrical properties, particularly at high frequencies. There are actually two groups of ceramic materials which are useful for high-frequency insulation. The steatite group, which includes "Frequentite," is marked by a very low dielectric loss at high frequencies and shows a progressive decrease in loss as the frequency is raised, even in the ultra-high frequency range. Quartz is the only material which has comparable electrical characteristics but it is more costly and is difficult to shape, whereas "Frequentite" and similar materials can be moulded to close limits. The permittivity is about 6 and, although not unusually high, it is higher than that of other insulators which show such a low loss.

The ceramics of the steatite group are derived from soapstone and consist of finely divided magnesium silicates. The firing process gives them a dense crystalline structure which results in a high mechanical strength although they are somewhat brittle. They are widely used for valve-holders, for the support of high-frequency circuits and units and in the construction of coils and condensers for use at high frequencies. When used for the insulation of ultra-high-frequency circuits, the low temperature coefficient of permittivity prevents an undue frequency drift as the circuits warm up.

High-permittivity Ceramics

The second group of ceramic insulators consists of materials derived from rutile, a crystalline form of titanium dioxide, which is characterised by a permittivity of 173 in the direction of the crystal axis. "Faradex" and other products in this group are obtained by firing this material with suitable binders, which reduce the permittivity to values ranging from 40 to 80. In spite of the high permittivity, the dielectric loss is of the same order as that of members of the steatite group and again shows a decrease at very high frequencies. The members of the rutile group are remarkable in having a negative temperature coefficient of permittivity, but this can be neutralised by combining members of this group with members of the steatite, which have a positive temperature coefficient. They find an important application in the manufacture of condensers for use at high frequencies, the high permittivity resulting in small overall dimensions while, in addition, the condensers are electrically stable and have a very low loss. The electrodes consist of silver fired directly on the surface of the ceramic.

In conclusion, it may be pointed out that this country has not lagged behind in the development work in connection with the production of synthetic insulators. Various British firms produce most, if not all, of the materials which have been mentioned. The essential raw materials for many of these products are available on an adequate scale in this country and the raw materials for others, such as the ceramic insulators, are to be found within the British Empire.

American Power Generation

Edison Electric Institute Report

THE addition of 1,790,000 kW to the generating capacity in the United States in 1940 brought the total to 40,330,000 kW, while schemes projected for 1941 represent 3,412,000 kW, 152.4 per cent. more than the 1940 total. To date a further 2,302,000 kW of generating capacity is scheduled for 1942.

In announcing these figures, the Edison Electric Institute states that, because of the part they play in the defence programme of the U.S.A., it is noteworthy that isolated industrial steam plants, which added 120,000 kW of capacity in 1940, will be increased by 250,000 kW in 1941 and an addition of 110,000 kW has been scheduled so far for 1942. The sum of peak loads on the various systems taken for the country as a whole is about 10 per cent. over 1939, the total installed generating capacity being about 30 per cent. in excess of the sum of the individual peak loads.

The report of the Institute adds that new army cantonments, camps and air bases and new munitions factories, wherever they have been located throughout the country, practically without exception, have been found to be reasonably within reach of existing power lines which have provided an adequate and dependable electric power supply as required. Moreover, so far as can be foreseen at present, except perhaps for isolated situations, there will be an ample supply of power in 1941 and 1942 to operate all the new munitions factories which are now projected. The increased power use which will come from employing more shifts in existing factories does not add appreciably to the peak load on power systems. If still further extensions of munitions factories should be undertaken, new generating capacity can be added to supply them as fast as they are built.

The output in 1940 by all undertakings, private and public, contributing to the public supply, amounted to 140,750 million kWh, as compared with 126,666 million kWh in 1939. Fuels of all kinds produced 94,500 million kWh, an increase of 13 per cent. over the previous year, while water power provided 46,250 million kWh, an increase of 7½ per cent. The water power production was stimulated by improved rainfall during the second half of the year.

On the basis of ten months' actual results, together with those of the last two months of the year estimated, sales of electricity in millions of kWh were as follows:—Domestic 23,250; small commercial 22,250; large power (industrial) 59,550; all other sales 13,450; total 118,500.

The grand total of consumers reached 30,091,500 in 1940, an increase of 986,000 during the year. There are 2,100,000 farm customers, of which private utilities are serving 1,500,000, or 71.4 per cent. About one-third of occupied farms are now taking electric service.

The report states that approximately 20 cents out of every dollar received from the domestic consumer goes to the various governments in taxation.

Canadian Water Power

Developments in 1940 to meet Wartime Needs

A SURVEY of hydro-electric progress in Canada during 1940 by the Hon. T. A. Crerar, Dominion Minister of Mines and Resources, reveals extensive activity in the provision of power for industry. The horse-power capacity of hydro-electric generating equipment installed in new and existing plants exceeded that of any of the preceding five years,

In this survey the Dominion Minister of Mines and Resources indicates that, although hydro-electric progress last year surpassed that of any of the preceding five years, 1941 is likely to see an even greater advance

while in addition power plants which will include an even greater installation are under preliminary or final construction. Furthermore, widespread extensions of transmission and distribution facilities have been made to serve new wartime industries and military establishments and to meet normal demands for mining, industrial and domestic use, both urban and rural.

Notwithstanding progressive monthly reductions in the sales of secondary power for use in electric boilers and for export to the United States, there is every indication that the figure for the total output of the central stations during the year will, when available, show a new record total of more than 30 billion kWh. Canada's growing industrial activity is emphasised by the fact that the consumption of " firm power " (total electricity sold, less power exported to the United States or used in electric steam boilers) in each month of 1940 from January to October, the latest for which figures are available, showed an increase over the corresponding months of the previous year.

New water-power installations during 1940 totalled about 300,000 HP, bringing Canada's total hydraulic installation at January 1st, 1941, to 8,584,438 HP.

Much of the increase was due to additions to existing installations, but two new stations were completed and brought into operation during the year. The larger of these was the 178,000-HP plant of the St. Maurice Power Corporation (owned jointly by the Shawinigan Water and Power Co. and the Brown Corporation) at La Tuque on the Upper St. Maurice River, in the Province of Quebec. The other was the 7,500-HP Hollow Bridge plant of the Avon River Power Co. on Black River in Nova Scotia. The larger additions to existing plants included a 53,000-HP unit installed in the Beauharnois Light, Heat and Power Co.'s station on St. Lawrence River and two 25,000-HP units in the West Kootenay Power & Light Co.'s Upper Bonnington Station situated on the Kootenay River, British Columbia.

After the completion of the work at Upper Bonnington the British Columbia Power Co.'s construction equipment was moved to Brilliant, the only remaining undeveloped site on the Kootenay River down-stream from Nelson, which will provide power for an installation of 90,000 HP.

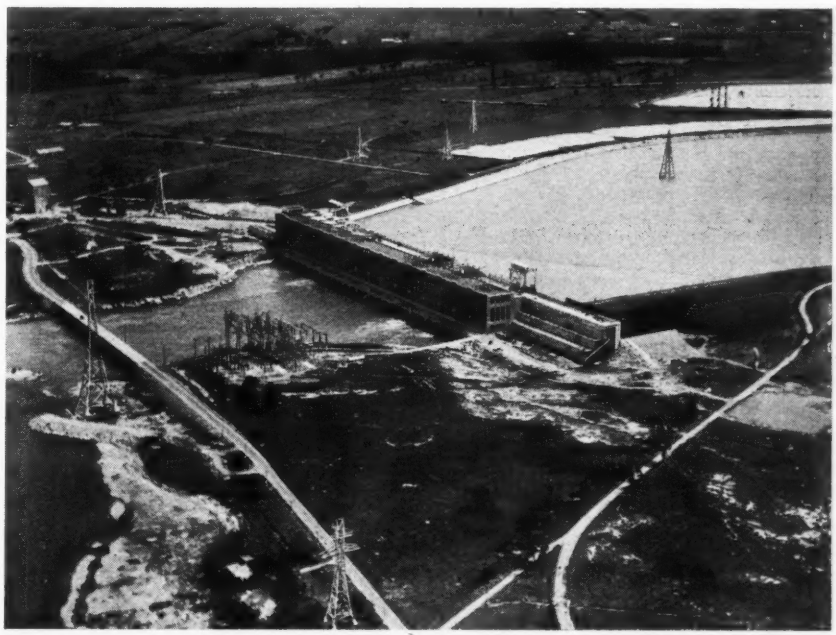
The construction of the first hydro-electric plant in the North-West Territories was planned for completion in 1940 by the Consolidated Mining and Smelting Co., to provide power for its Con and Ptarmigan mines. Unexpected delays have prevented the scheduled completion of the plant, but it is now expected that power from it will be available early in 1941. The plant, which is on Yellowknife River at the outlet of Bluefish Lake, will contain one 4,700-HP unit operating under a head of 110 feet.

No new water-power development was undertaken in the Prairie Provinces during 1940. The Manitoba Power Commission extended its transmission system by the construction of 40 miles of 66,000-V, three-phase line between St. Norbert and Elm Creek. The Birtle-Binscarth line was converted to 33,000 V, three-phase, and extended 5.5 miles to the town of Russell. The Commission also constructed 52 miles of line to serve Army and Air Force training establishments.

Owing to the rapid increase in industrial load at Sault Ste. Marie, the Great Lakes Power Co. proceeded with the enlargement of its hydro-electric development at Upper Falls on Montreal River. The dam at this development is being increased in height and a second 10,000-HP unit is being installed. It was expected that this unit would be in operation early in 1941. Increasing the height of the dam and providing additional storage at Upper Falls automatically provides power for a possible additional unit at the Lower Falls station on the same river. The company reports that if the power demand continues to increase as a result of war activity this second unit can be installed at Lower Falls as quickly as deliveries of equipment can be made.

The Hydro-Electric Power Commission of Ontario was engaged in the construction of a number of projects connected with the generation and transmission of hydro-electric power throughout the Province. Investigations were also carried forward looking to new sources of power to meet future demands.

In the Patricia-St. Joseph district, the installation of unit No. 3 (7,500 HP) was completed at the Ear Falls development on the English River in January, 1940. The rated installed capacity of Ear Falls is now 17,500 HP.



The Beauharnois Light, Heat & Power Co.'s 400,000 HP hydro-electric plant on the St. Lawrence River, Quebec

In the Georgian Bay system, a 5,000-kVA frequency changer set was installed at Hanover for the interchange of power with the Niagara system. Work was commenced on the construction of Big Eddy Development on Musquash River. Big Eddy Development will have a turbine capacity of 10,000 HP in two units. The plant is expected to come into operation in November next.

In the Eastern Ontario system, work was begun on the construction of Barrett Chute Development on Madawaska River, about five miles above Calabogie village. The development will have a rated capacity of 56,000 HP under a head of 154 ft, and will contain two units with Francis type turbines. A large storage dam will be constructed at Bark Lake on Madawaska River. The scheme is expected to be in operation late in 1942. During the Commission's fiscal year ended October 31st, 1940, approximately 322 miles of transmission lines and 1,500 miles of rural lines were constructed.

In Quebec, as already mentioned, the St. Maurice Power Corporation completed its new station at La Tuque on Upper St. Maurice River with four units aggregating 178,000 HP operating under a 114-ft. head. This station will provide for the Brown Corporation's sulphate pulp mill at La Toque and supplement the general distribution of the Shawinigan Water and Power Co.

Extensions at Beauharnois

The Beauharnois Light, Heat and Power Co. completed in October the installation of the tenth unit of 53,000 HP in its station at Beauharnois on St. Lawrence River. The eleventh unit is planned for operation in February, 1941, and work is proceeding on the installation of the twelfth and thirteenth units of the same capacity. During the past summer dredging of the intake canal was continued and the construction of extensive control and remedial works in the St. Lawrence River commenced.

The Aluminium Power Co., Ltd., replaced the runner on a turbine in its generating station at Chute à Caron on Saguenay River, thereby increasing the capacity of the unit from 65,000 to 70,000 HP. At the Quebec Streams Commission's development on the upper Ottawa River, the work inaugurated by the former Quebec National Electricity Syndicate progressed steadily during the year. The plant is expected to be in operation by August 1st, 1941. Its ultimate installation is 48,000 HP under a 60- or 70-ft. head.

Extensive transmission line construction was general throughout the Province of Quebec during the year. The Shawinigan Water and Power Co. completed a double-circuit 110 kV line, tapped off two of its main Montreal feeders. The line crosses the St. Lawrence River near Berthier on two towers each 375 ft. in height with a span of 3,900 ft., and will provide additional facilities for the City of Sorel. A new 220-kV line between Three Rivers and Quebec to connect the Shawinigan and Saguenay Systems, was built for the Aluminium Co. of Canada. One, 23½ miles in length, connects Ile Maligne generating station with Arvida, while the other, four miles in length, connects Chute à Caron generating station with Arvida. Both will operate at 154,000 V.

The Quebec Streams Commission maintained successfully the desired regulation of flow on controlled rivers through its extensive system of storage reservoirs in various parts of the Province. The survey of the storage possibilities of Grand Lake Victoria was continued, and preliminary studies of prospective water-power developments were continued on the Opawica and Madeleine Rivers.

The Aluminium Co. of Canada has commenced construction of a storage dam at the outlet of Manouan Lake, a tributary of Peribonka River, to lessen the spring floods in the Lake St. John reservoir and store 56 billion cu. ft. of water to augment the winter flow at the Ile Maligne and Chute à Caron hydro-electric plants. No new hydraulic construction was in progress during the year in the Province, but the New Brunswick Electric Power Commission commenced work on a transmission line to connect its Minto-Moncton line and its Moncton-Saint John line. This tie-line, which is 25 miles in length, is a 66-kV steel-tower line.

New Plants in Nova Scotia

Two hydro-electric generating stations were completed during the year in Nova Scotia. One of these, the Barrie Brook station of the Nova Scotia Power Commission was included in last year's totals as it was assumed that it would be completed before the end of that year. The necessary adjustment has been made. This station is near the town of Mulgrave and supplies power throughout a considerable area in the district adjacent to the Strait of Canso, both on the mainland and on Cape Breton Island and on Isle Madame.

The Avon River Power Co., a subsidiary of the Nova Scotia Light and Power Co., completed and brought into operation its second generating station on Black River, known as the Hollow Bridge station. The installation operates under a net working head of 150 ft. and comprises a 7,500-HP turbine temporarily driving a 3,500-kVA generator. Upon delivery of a 6,250-kVA generator, now on order, the 3,500-kVA generator will be removed for installation in the company's third station on this river, now under construction at Hell's Gate.

A considerable extension was made to the transmission and distribution network of the Nova Scotia Power Commission during the year. The construction of 275 miles of line will provide service over a widespread area.

Parliamentary News

By our Special Reporter

Reliability of the Grid

IN the House of Commons last week Mr. Rhys Davies asked the Minister of Transport whether he was aware of the serious inconvenience caused in some parts of the country by the breakdown of the grid system of supplying electricity during a recent snowfall whilst local supplies were still available to consumers not on the grid; and whether, as this was a recurring difficulty, he would inquire into the whole matter.

Lieut.-Col. Moore-Brabazon said he was aware of only one case where, as a result of the recent snowfall, there had been a breakdown of the grid transmission lines of the Central Electricity Board involving a partial loss of supply. The factor of safety of the grid transmission lines was in excess of that laid down by the Electricity Commissioners' regulations, and he did not consider that any inquiry was called for. Moreover, there were numerous instances where the grid system had successfully met the needs of difficult situations; it had, indeed, proved itself in war to be a national asset of the greatest possible value.

Scottish Water-power Schemes

Mr. Keeling asked whether the Government's decision not to take any steps to put the Caledonian Power Scheme into operation implied that it would oppose the Grampians Electricity Supply Draft Provisional Order.

Lieut.-Col. Moore-Brabazon said it did not. The two schemes were entirely different. He was not in a position to say what views might be expressed upon the proposals in the draft Order by the various Government Departments concerned.

Coal Prices

Mr. Lipson asked the Secretary for Mines if he was aware of the continual increases in the price of coal to public utility undertakings, which had necessitated as much as 25 per cent. increases in electricity charges in some instances; and if he would take steps to prevent further increases taking place.

Mr. Grenfell said that the price of coal was strictly controlled and it had not been increased to public utility undertakings to a greater extent than to other consumers. He knew of no increases in coal prices which would have justified a 25 per cent. increase in charges, but, if the hon. member would furnish him with details of particular cases he would look into them.

Coal-cutter Control

WHETHER coal face machinery should be controlled by hand or remotely was debated at a recent meeting of the Midland branch of the Association of Mining Electrical Engineers at Mansfield. It was argued that both methods could be equally efficient, but a more important aspect was that of safety, and remote control necessitated the trailing cable being "alive" only for so long as the particular cutter attached to it was actually at work. While remote control might be favoured, colliery managers had to consider economy as well as safety and maintenance. Each cycle of operations should be completed once in every twenty-four hours, since if breakdowns occurred there would be loss of output and consequently increased cost.

Heat Treatment Furnaces

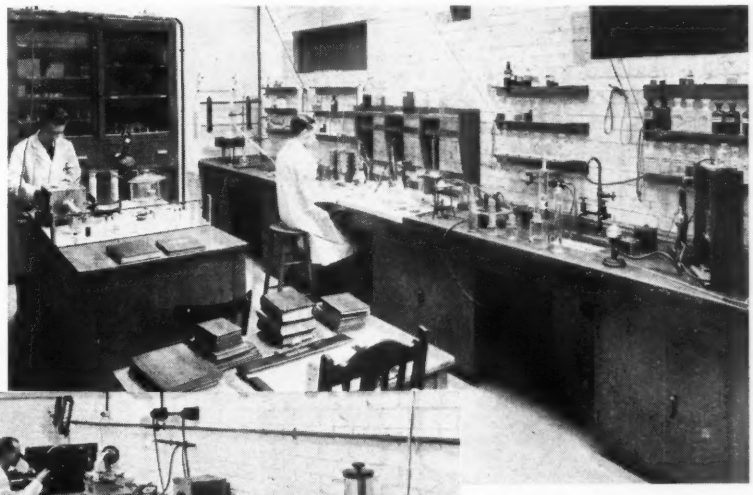
Production at a New Works

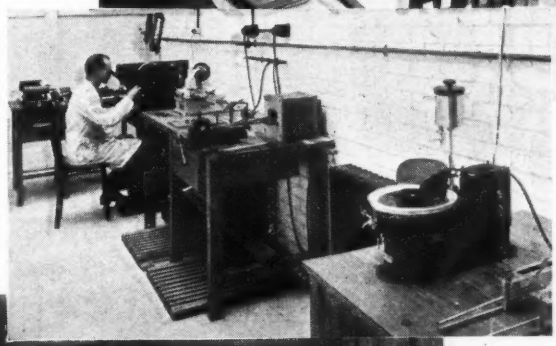
THE speed-up in furnace production as a notable part of the electrical industry's war effort, to which we referred in our issue of January 31st, is well exemplified in the preparations made by Wild-Barfield Electric Furnaces, Ltd., to cope with the intensified demand for their products. While it was clear two years ago that the Holloway works were becoming inadequate to meet normal engineering developments and a new three-acre site provided with good access facilities had been selected, it was the outbreak of war that caused the plans to be put in hand without delay, resulting in the completion to date of two main erection bays 40 ft. wide by 27 ft. high to the eaves, in addition to offices, stores and despatch department.

These works are intended mainly for the manufacture of relatively small furnaces in large numbers and of heating elements and other electrical details for the associated company, G.W.B. Electric Furnaces Ltd., which is responsible for the design and installation of larger mechanically operated furnaces.

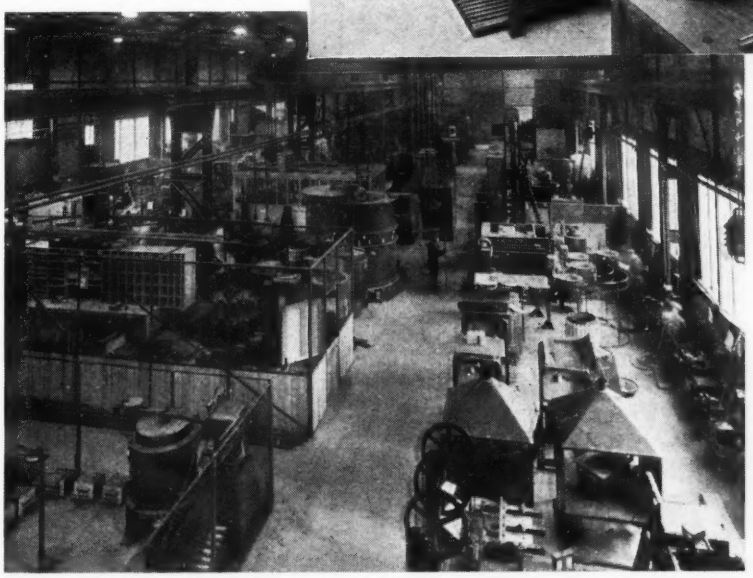
Each bay is lighted by two rows of electric discharge lamps at a height of 26 ft. giving a general illumination of from 15 to 20 ft.-candles. Local lighting is provided in addition in the machine shops and elsewhere and socket-outlets are fitted in the assembly pits.

A shop temperature of 60 deg. F. is maintained by means of hot-water radiators in association with motor-driven fans mounted 12 ft. above floor level. Machine tools do not figure prominently in electric furnace manufacture, but the majority of those installed (including lathes, drills, shapers and grinders) are driven individually by Brook motors. Rolls for plate and angles, shearing and guillotine machines, both motor-ised and hand-operated are installed. Extensive use is made of spot- and arc-welding.





Chemical laboratory at the Wild-Barfield works and (left) physical laboratory



General view of one of the main bays

At the front of one bay is a test department which is grouped with the main distribution panels. Electricity is taken from the Watford Corporation mains at 415 V, three-phase, 50 cycles. The test bay has a 150-kVA three-phase transformer to give voltages from 20 to 600, a Scott-connected group to give a two-phase output at a variety of voltages, and a 50-kVA single-phase transformer. Transformer tappings are brought to terminals on test panels with ammeters and voltmeters of various ranges. The 110-V tapping on the three-phase transformer is also used to supply the single-phase portable drills and bench tools which are balanced across the three-phase mains.

A single-storey laboratory building is divided into chemical and physical sections. The first has titration benches running the whole length on one side and a furnace bench along the other. The physical department accommodates the equipment for tensile, impact and hardness testing, and also houses the dark room for photomicrography and spectroscopic analysis as well as the balance room. Adjacent to the laboratory is the heat-treatment shop containing equipment for the production of protective atmospheres. High- and low-pressure air lines are fitted here and in the laboratory building.

The office block is a two-storey brick and reinforced concrete building. On the ground floor are drawing office, general office, etc. The second floor accommodates sales, accounts and executive offices.

The usual fire-fighting, first-aid and A.R.P. and canteen services are adequately catered for, in addition to G.P.O. telephones and an automatic internal system, a staff locator system is provided.

All of the work has been carried out under the supervision of Mr. J. P. Coleman, works director. The contractors included the Service Electric Co., Ltd. (lighting and power installation); John Evans & Co., Ltd. (heating); and Ericsson Telephones, Ltd. (automatic telephones).

COMMERCIAL and INDUSTRIAL NEWS

Contractors and the Register. Purchase Tax and Prices

The E.C.A & the N.R.E.I.C.

AT a recent meeting of the Emergency Committee of the Council of the Electrical Contractors' Association, with Mr. Walter Riggs (president) in the chair, a resolution from the Hull branch was considered proposing that the National Register of Electrical Installation Contractors should suspend its inspections for the period of the war. The branch stated that the majority of its members were far too busy on Government work to give time to taking an inspector about.

The Committee decided to reply that in view of present circumstances facilities might be given to inspectors to visit and examine such work as might be desired without the personal attendance of the contractor concerned.

Consideration was given to the desirability of producing a suitable memorandum embodying a résumé of faults found by the National Register during the inspection of installations for distribution among members' operatives. The suggestion was adopted in principle and the Director (Mr. L. C. Penwill) was asked to draft a memorandum for submission to the Committee at its next meeting.

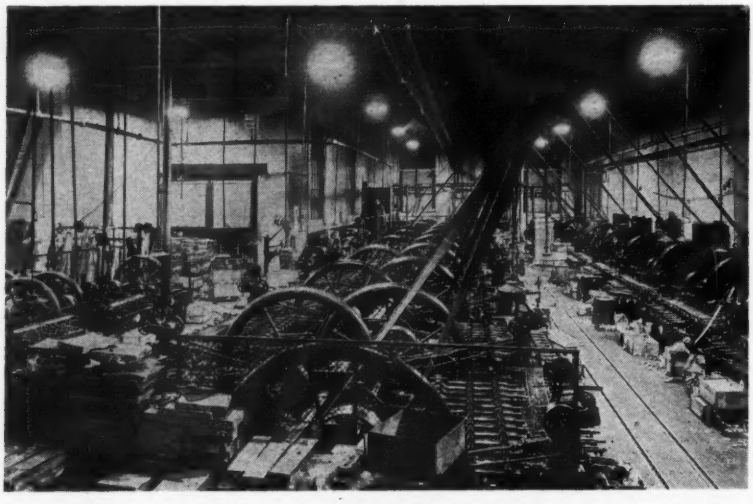
Architects' Specifications

At the same E.C.A. meeting the Director referred to negotiations with the Electric Light Fittings Association a considerable time before which resulted in an agreement on procedure to be observed by manufacturers when submitting quotations in response to prime costs inquiries. Similar negotiations had been proceeding with the Heating, Cooking and Domestic Appliances Section of B.E.A.M.A. with the result that it had been agreed as follows: When dealing with architects' requirements members of the Section should quote list prices only unless (i) the name of the architect's client was divulged, in which case the terms appropriate to such a client under the Fair Trading Policy might be quoted, or (ii) the order was placed through a recognised trade channel, in which case the list prices quoted to the specification might be made subject to a stated discount.

Improving Factory Lighting

During the past few years great strides have been made in applying artificial light to various manufacturing processes in an effort to facilitate output, avoid wastage, and at the same time promote the well-being of employees. A typical instance is an installation in the north of London carried out for Betts & Co., Ltd., makers of tinfoil products, who, following an extensive investigation of the different types of lighting by their chief engineer, Mr. S. Green, decided to adopt a system utilising fluorescent type mercury vapour electric discharge lamps.

Previously the lighting was provided by seventy-five gas units fitted in a distributing type of reflector mounted approximately 6 ft. above floor level. These gave an illumination varying from 2 to 4 foot-candles over the actual working area, while intervening spaces, such as gangways, etc., were relatively dark. Apart from the low and uneven illumination the glare present was pronounced, resulting in considerable eye-strain to the operatives and having a generally depressing effect upon them.



Good lighting in a London tinfoil works

The new lighting system relies upon a combination of 18-in. diam. "Saaflux" dispersive reflectors and 400-W G.E.C. "Osira" fluorescent lamps. The units are spaced at approximately 20-ft. centres and mounted at about 20 ft. above floor level. This arrangement provides an even distribution over the whole working plane of the order of 13 foot-candles. The illumination is free from glare and harsh shadows have been eliminated, while the quality of the light is such that it materially accelerates production and at the same time ensures a high uniform standard. The scheme was prepared and carried out by G. N. Haden & Sons, Ltd.

Trading with the Enemy Branch

The Offices of the Trading with the Enemy Branch (Treasury and Board of Trade) have moved from Imperial House and Alexandra House, Kingsway, to 24, Kingsway, W.C.2 (telephone: Holborn 4300; telegraphic address: "Tradenemy, London").

Purchase Tax and Retail Prices

In response to inquiries the Central Price Regulation Committee states that the retail price, including Purchase Tax, should normally be rounded off to the nearest farthing, particularly on small-priced articles. In other cases it may be rounded off to the nearest penny. In order to do this some prices should be rounded *down* and others up, so that the amount recovered by a trader on the whole of his sales is as near as possible equal to the amount he has himself paid on account of tax.

In view of the fact that the retailer has to finance the tax from the time he himself pays it until he recovers it from the public, the Committee has no objection, however, to the rounding-off process being on the whole slightly in favour of the retailer, provided the additional amount is not more than 4 to 5 per cent. of the total amount of tax involved in the rounding-off process.

Import Licensing Requirements

The attention of importers is drawn to the fact that the issue of an import licence does not, of itself, entitle the licence holder to make payment in any currency but that of the country of origin of the goods to be imported, or in sterling payable to that country in the manner prescribed by the Exchange Control. Importers who require to make payment in any other way should explain their reasons when applying for an import licence. If they fail to do this they may find that the banks have no authority to make an exception to the general rule.

Non-delivery of Torch Bulbs

In the King's Bench Division this week Mr. Justice Cassels had before him an action by J. M. Webber & Co., Ltd., Great Eastern Street, E.C., against Roditi Bros. Ltd., of Bishopsgate, E.C., to recover damages arising from a breach of contract by the defendants, in the non-delivery of electric torch bulbs.

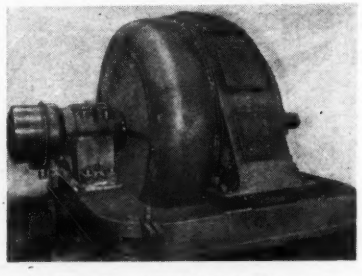
The plaintiffs' case was that they entered into contract with the defendants for the supply to them of two million torch bulbs, of Japanese origin, in February last year.

Mr. G. O. Slade for the plaintiffs, said the agreed price was 5s. 2½d. per 100 bulbs. The bulbs had not been delivered. They could not be shipped from America, where they were, as they had been commandeered by the Government. Owing to the non-delivery the plaintiffs had lost the profits they would have made by the re-sale of the bulbs in this country.

The action was not defended. His Lordship assessed the damages at £1,996 and gave judgment for plaintiffs for this amount with costs.

Lancashire Dynamo Progress

Last year the output of electric motors by Lancashire Dynamo and Crypto, Ltd. reached a new high level. Apart from munition work there were a number of orders for electric power stations, including a "Corcooled" dust-tight motor of 525 HP at 297



"Lancashire" 525-HP dust-tight motor

RPM for driving pulverisers. Among the chief export orders were hose-proof motors for newsprint mills and 4,000 HP for complete boiler house installations for Australia. South Africa, New Zealand, Malaya and Argentina also provided outlets for the company's products, one order for the first-named Dominion covering 100 all-steel scraper haulage motors.

Institute of Welding

In the Chancery Division recently Mr. Justice Simonds had before him a petition by the Institute of Welding, Ltd., Buckingham Palace Gardens, for a confirmation of an alteration of its objects.

Mr. Gedge, for the Institute, said it was formed for the purpose of furthering the science and art of welding from gases. The proposal was to add to its activities after the word "gases" "and electricity." It was devoted entirely to furthering the interests of science and thus obtained exemption from rates. It had a membership of 1,162.

His Lordship assented to the alteration.

Heating Appliances Export Group

The Heating Appliances & Accessories Export Group has been recently formed. The manufactures included in this group are described as "all plant in connection with heating," and they include boilers of all descriptions for low-pressure steam and hot water, mechanical stokers, oil burners and gas firing apparatus, valves, boiler mountings, steel or cast-iron radiators, hot water pipes and connectors, converters, humidifiers, calorifiers, automatic temperature control and thermostats, steam traps, unit heaters, jacketed pans and kettles, etc. The chairman and secretary is Mr. Arthur G. Marshall, and the offices are at 2, Howard Street, Strand, W.C.2.

A.M.E.E. Benevolent Fund

The Association of Mining Electrical Engineers has inaugurated a benevolent fund for the assistance of members in time of trouble. Later it is hoped to extend benefits to the relief of dependants of deceased members. It is emphasised that the fund will in no way cut across the excellent work of the E.I.B.A. or the I.E.E. Benevolent Fund; it is the aim to operate the fund in circumstances where these or other charitable organisations do not generally function.

The "Autocar" Handbook

The sale of nearly a quarter of a million copies demonstrates the popularity and usefulness of the *Autocar* Handbook. In the fourteenth edition just published (Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1, price 3s. net) a thorough revision has been undertaken, rendering it of even greater value for wartime motoring not only to the general private user but also to members of the Services. After an introduction to the elementary principles there is a description of the entire mechanism of the modern car, the final chapters containing a comprehensive survey of motoring law, with advice about present-day motoring problems.

"British" Goods in South Africa

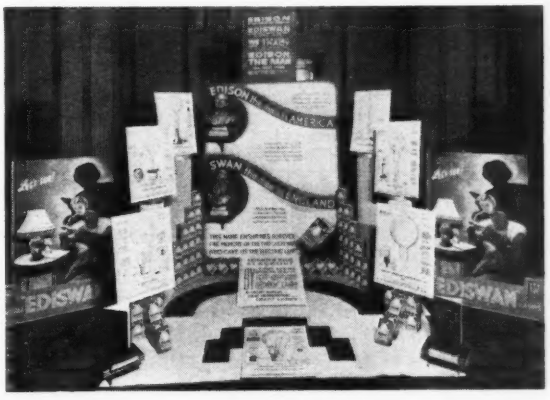
According to the Capetown correspondent of the *Chamber of Commerce Journal*, it is alleged that certain local dealers in Capetown are selling Japanese electrical articles which are marked "British made." This is not a new allegation by any means, but it is said to have revived lately. Supporters of the "Buy British" policy are urged to examine so-called British articles, as some dealers are, it is alleged, sending samples of British made articles to Hong Kong, where Japanese controlled firms are making inferior imitations and marking them "British made." The chief sufferers are the British manufacturers of electrical materials, principally small things like lamps, lampholders, torches and switches. Action is likely to be taken against dealers who have imported material from Hong Kong which infringes patent rights, as there is great resentment by the public against being misled by articles such as those of an inferior quality manufactured in Hong Kong which purport to be British, but the sale of which actually benefits Japanese exporters.

Aluminium Alloy Data

"Hiduminium Technical Data," a new publication replacing the present data sheets, presents full details, including chemical composition, physical properties, mechanical properties, properties at elevated temperatures, etc., of the complete range of "Hiduminium" alloys. This comprises the "R.R." series and also the more recent "Anticorodal" series such as Hiduminium 15, 23, 33, 35, 40, 42 and 45 which were introduced to meet the increasing demand for alloys combining high corrosion resistance with good mechanical properties. There is also included an index to specifications.

Each alloy is presented across the inside of two facing pages, so that the book may lay open on the desk and all the properties of a particular alloy may be seen without turning the page. To ensure flat opening, a spiral binding of an improved type is employed and provision is made for the inclusion of new sheets. Copies of the publication may be obtained from High Duty Alloys, Ltd., Slough.

Copies of "Aluminium Alloys" from the book by Professor Zeerleder, are also available. Applicants for this volume should state in which industry they are engaged or, if students, which profession they are studying.



A lobby dressing arranged by the Edison Swan Electric Co., Ltd., at the Regent Cinema, Bradford, in connection with the film "Edison the Man"

Women Tram-drivers and Meter Readers

In view of the growing shortage of tram-drivers as the older men are called up, the Glasgow Corporation Transport Committee has authorised the transport manager to engage women drivers as the need arises. At Blackburn the Finance Committee has authorised its chairman and vice-chairman to deal with the employment of women meter-readers to relieve men called up for the Services or work of national importance. There will be negotiations with the Transport and General Workers' Union concerning terms of employment.

Aircraft Identification

Everybody, whether he be a member of the R.A.F., the Air Defence Corps, Observer Corps, or Home Guard, a roof spotter, or just a member of the general public is perforce interested in aircraft and the rapid identification of friendly or hostile planes. To assist in this the Harborough Publishing Co., Ltd., Allen House, Newark Street, Leicester, has performed a most useful service by bringing out a well-produced publication entitled "Aircraft of the Fighting Forces." Compiled by H. J. Cooper and O. G. Thetford and edited by D. A. Russell, this contains 87 pages of descriptive information, together with an equal number of plans, half of which occupy single pages and the remainder double or treble pages. Excellent photographs of all models are also included, most of them by members of the *Flight* staff. It is proposed to publish the work annually as long as the title is appropriate. The price is 7s. 6d., Horace Marshall & Son, Ltd., Temple House, Tallis Street, London, E.C.4, being the sole distributors.

Electrical Year Book

This pocket size collection of data and tables and rules should not need any introduction. It is now in its thirty-fourth year, published at 2s. net by Emmott & Co., Ltd., 31, King Street West, Manchester, 3, and 28, Bedford Street, London, W.C.2. The 1941 edition includes such new matter as an explanation of distant control by superimposed "ripple" on AC circuits. To the rectifier section details have been added about the pumpless air-cooled steelclad type. The I.E.E. Wiring Regulations are reviewed in some detail and another fresh section describes various tests for the localisation of cable faults, while much of the matter relating to testing sets has been rewritten.

Electrical Pioneers' Portraits

The Bureau de l'Union Internationale des Télécommunications, 1, Effingerstrasse, Berne, informs us that it has produced two further portraits in its series of men who have contributed to the advance of telecommunications. They are Gauss & Weber; the Union has previously published portraits of Morse, Hughes, Bell, Marconi & Baudot. The photogravure prints measure 23 cm. by 17 cm. and cost 2.50 Swiss francs each.

Changes of Address

The registered office of the Telegraph Construction & Maintenance Co., Ltd., and Submarine Cables, Ltd., is now Blackstone, Redhill, Surrey.

The London office of Taylor, Tunnicliff & Co., Ltd., is now at 85, Streatham Hill, London, S.W.2, (telephone: Tulse Hill 5255/6).

Catalogues and Lists

S. S. White Co., of Great Britain, Ltd., Britannia Works, St. Pancras Way, Camden Town, London, N.W.1.—Brochure, illustrated with sketches and data curves and tables, describing the general uses of flexible shafting for remotely controlling switches and mechanisms of many kinds in inaccessible positions.

Copes Regulators, Ltd., 28, High Street, High Wycombe, Bucks.—A pamphlet illustrating the company's new "Flowmatic" dual-control boiler feed water regulator.

British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2.—Broadsheet L706/M containing details of a representative selection of A.R.P. products.

ELECTRICITY SUPPLY

Hull Secures Coal Concession. Birkdale Undertaking Purchase

Barrow-in-Furness.—Rural Reconstruction.—At a recent meeting of the Corporation Electricity Committee intimation was received from the Electricity Commissioners that they would give favourable consideration to the borrowing of £34,710 for the reconstruction of the rural electricity network.

Cable Extensions.—The Corporation Electricity Committee is to extend cables at a cost of £634 to meet the growth of load in the Greengate Street area, to lay an additional high-voltage cable at a cost of £5,050, and is to replace trunk mains serving Grange with underground cables at a cost of £5,000.

Blackburn.—Opposition to Coal Price Increase.—The Corporation Electricity Committee is to make representations to the Association of Municipal Corporations with a view to enlisting support against the continual increase of coal prices to public utility undertakings.

Heating of Public Library.—The borough electrical engineer's estimate of £630 for supplying electricity for heating purposes at the Public Library has been confirmed by the Town Council.

Formby. — Dearer Electricity.—The Urban District Council Electricity Committee is to impose a 10 per cent. war surcharge on all electricity accounts rendered after the March quarter.

Grampians.—Hydro-Electric Scheme.—A Provisional Order applied for by the Grampian Electricity Supply Co. seeks powers to construct a generating station and to utilise the water power of Glen Affric and Glen Cannich. The scheme provides for the construction of a dam across the River Affric, for upholding the waters of Loch Affric, Loch na Camaig, Loch na Laghair, Loch Pollan Fearna, Loch Beinn a' Mheadhoin and the River Affric, thereby submerging certain lands. It is also proposed to build an aqueduct from the dam to the River Glass and also an intake and overflow weir on the An Cam-allt, together with another dam and a second aqueduct. Powers are also sought to construct roads, acquire lands, either by compulsion or agreement, and to raise additional capital not exceeding £3,000,000. The Inverness Town Council has decided unanimously to oppose the Order and petitions against it have been presented by several other parties. It is anticipated that the hearing will commence early next month.

Halifax.—A Successful Year.—Increases of from 62 million kWh to 67 million kWh in energy sold, from £262,818 to £299,332 in revenue, and from £28,633 to £54,100 in net profit are reported by Mr. A. G. Connell, engineer and manager of the Corporation Electricity Department, in his review of the year ended March 31st last. The increase in sales would have been even greater but for the discontinuance of the tramway supply, which in 1938-39 amounted to approximately 2 million kWh. The number of consumers rose from 26,692 to 27,769.

Huddersfield. — Transformers. — The Town Council has approved the purchase of additional transformers with a combined capacity of 1,600 kVA to meet the increased load to existing substations; also the provision and laying of cables where necessary for feeding the transformers.

Hull.—Coal Supply Concessions.—Many municipal electricity undertakings will be interested in the successful efforts of Mr. D. Bellamy, manager of the Corporation electricity undertaking, in securing concessions in the matter of coal supplies. The Ministry of Mines directed that the present supplies of coal from the Midland (Amalgamated) District should cease from February 1st and be superseded by supplies from Northumberland and Durham, the Electricity Department to make all arrangements and bear all expenses. By this it was estimated that the additional cost to the department would be £19,000 for the current year to March 31st and £97,000 for the full financial year. This would have necessitated an increase of 12½ per cent. in prices charged to electricity consumers. On representations being made by Mr. Bellamy the Ministry's proposals were modified to the extent that supplies of coal could be drawn in full from the two nearest collieries with which the Department dealt and 20 per cent. from the remaining five collieries. As a result approximately 40 per cent. of requirements will continue to be obtained from existing sources at the existing rates, reducing the cost of the amended proposals to £11,500 for the current year and £55,060 for a full year. At an interview with the Minister of Mines, in which representatives of the Harrogate and York electricity undertakings took part, a promise was given that there should be no interference with existing supplies until satisfactory alternative supply arrangements were completed and that a scheme for the rationalisation of the additional freight charges throughout the country would be prepared and be available in about two months.

Street Lighting. — The city engineer has reported to the Corporation Emergency Committee that the complete estimate for installing a modified system of street lighting throughout the city, terraces excluded, is £8,415, with an annual maintenance and lighting cost of £16,832.

Boiler Alterations.—The Corporation Electricity Committee is to modify a boiler at Sculcoates power station at a cost of £1,355 and purchase a set of preheater elements at £303.

Shelter Heating.—The Corporation Emergency Committee has decided to heat small shelters by means of electricity.

Ilford.—Reduction in Charges.—The wartime increase of 33⅓ per cent. on consumers, total bills for electricity is to be reduced to 20 per cent., representing a saving to consumers amounting to £32,000.

Cable Renewal.—The Corporation Emergency Committee is to renew the fire-call bells and light cables at Perth Terrace at a cost of £127.

Inveraray.—Special Order.—The Electricity Commissioners have made the Grampian Electricity (Argyll) Special Order, 1940, which gives the Grampian Electricity Supply Co. powers to supply electricity in the royal burgh of Inveraray and part of the County of Argyll. One article of the Order empowers the Oban Town Council and the Campbeltown & Mid-Argyll Electricity Supply Co., Ltd., to transfer their undertakings to the Grampian Co. at any time after the commencement of the Order. A schedule to the Order lays down a quarterly minimum charge of 10s. with a maximum kWh charge of 10d., but it also sets out an alternative two-part tariff with a quarterly charge of 6s. 3d. per habitable room with a secondary charge of 2d. per kWh.

London.—Screening of Apparatus.—The L.C.C. has voted £3,000 for the screening of electrical apparatus.

Hackney.—Although he cannot record the usual account of continued development and increased sales, Mr. E. A. Mills, the borough electrical engineer, is able to report that, notwithstanding a slight decrease in revenue last year (from £470,584 to £469,344) and a considerable increase in working expenses from (£323,969 to £349,467), it was not found necessary to increase charges before the end of the year. In January last year it was estimated that the year's working would result in a deficit of £14,310 as compared with a surplus of £29,610 in the previous year, but actually there was a loss of only £4,154. In addition to this deficiency there was, however, a charge of £16,011 in respect of the scheme for air-raid precautions, making a total deficit of £20,165. Electricity sold amounted to nearly 72 million kWh as compared with over 75 million kWh in the previous year, while 1,794 new consumers brought the total number connected to 55,364. A further 1,587 cookers, 367 wash boilers, 1,494 water heaters, 1,566 fires and 892 kettles have been hired by consumers.

Battersea.—The Borough Council is recommended to apply for sanction to borrow £2,317 for three transformer substations.

Southwark.—Electric heating is to be provided in public shelters at a cost of £6,678.

Pontefract.—Cheaper Electricity.—The West Riding Automobile Co., Ltd., which supplies electricity to the town, is bringing into force reduced rates and alternative tariffs, and has agreed to incur no capital expenditure or large item of revenue expenditure without the Corporation's consent. The company also is to pay the Corporation half its profit after deduction of depreciation, and 8 per cent. on the company's capital.

Southport.—Purchase of Birkdale Undertaking.—The Corporation is to purchase the undertaking of the Birkdale District Electric Supply Co., Ltd., for £100,000. In connection with the purchase the Council is to apply for sanction to a loan of £60,000; the remaining £40,000 is to come from the Corporation's electricity undertaking's revenue account. The Electricity Commissioners have approved the purchase subject to internal financial resources being employed and the borough treasurer has stated that there is sufficient for the purpose. Birkdale consumers will benefit at once financially to the extent of £3,000 to £3,500 a year by reduced meter charges and discount on prompt payment of accounts.

Stoke-on-Trent.—House Wiring Deferred.—The deputy chief architect having reported further on the difficulties in carrying out the wiring of 115 houses on the Corporation's Meir Estate (No. 1 site) it has been decided to defer the execution of the work.

Supply Extension.—The Electricity Commissioners have sanctioned the borrowing of £3,750 in connection with the supply to Old Whieldon Road.

Infirmary Supply.—Part of the distributor main in Queen's Road is to be relaid at an estimated cost of £400 to enable an additional alternative supply to be given to the Infirmary.

Worthing.—Council Not to Oppose Bill.—The Rural District Council has decided not to oppose the Bill submitted to Parliament by the Mid-Southern Utility Co. to raise additional capital and for other purposes.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1939

10637. "Automatic train-control systems." Siemens & General Electric Railway Signal Co., Ltd., T. Austin and J. E. Mott. April 5th, 1939. (532096.)

10985. "Circuit breakers of the mercury contact type, and mercury switches." A. H. Stevens (Adlake Co.) April 11th, 1939. (531890.)

15451. "Methods of producing optical effects." British Thomson-Houston Co., Ltd., and D. Gabor. May 24th, 1939. (Cognate application, 19720/39.) (532106.)

17172. "Electron discharge devices." F. J. G. Van Den Bosch, and Vacuum-Science Products, Ltd. June 12th, 1939. (532025.)

17261. "Electrical discharge circuits." A. A. Thornton (Philco Radio & Television Corporation). June 13th, 1939. (532110.)

17656. "Electrical insulating material." Standard Telephones & Cables, Ltd., and T. R. Scott. June 16th, 1939. (532114.)

19978. "Electric insulators." Bullers, Ltd., and G. H. Harris. July 8th, 1939. (532117.)

20210. "Printing telegraph exchange systems." Standard Telephones & Cables, Ltd. (P. J. Clemens). July 11th, 1939. (531902.)

20211. "Electron discharge devices." Standard Telephones & Cables, Ltd., and A. I. Vangeen. July 11th, 1939. (531903.)

20212. "Electron discharge devices." Standard Telephones & Cables, Ltd., and F. D. Goodchild. July 11th, 1939. (531904.)

20261. "Dynamic braking apparatus for controlling alternating current motors." Brookhirst Switchgear, Ltd., and A. G. Shreeve. July 12th, 1939. (531907.)

20318. "Frequency changers." British Thomson-Houston Co., Ltd., and A. H. Maggs. July 12th, 1939. (531911.)

20349. "Navigation aiding radio transmitters." Marconi's Wireless Telegraph Co., Ltd., E. Green and N. E. Davis. July 12th, 1939. (532122.)

20466. "Electric circuit-breaking devices." Crompton Parkinson, Ltd., and H. Astbury. July 13th, 1939. (532128.)

20507. "Cable sealing boxes." A. Reyrolle & Co., Ltd., and O. Robson. July 14th, 1939. (531969.)

20598. "Very high frequency electron discharge apparatus." Standard Telephones & Cables, Ltd., and D. H. Black. July 14th, 1939. (531977.)

22875. "Protective arrangements for transformers and the like." British Thomson-Houston Co., Ltd. August 8th, 1938. (531933.)

22876. "Ironing presses." British Thomson-Houston Co., Ltd. August 9th, 1938. (531934.)

22877. "Electric motor-control systems." British Thomson-Houston Co., Ltd. (White Elevators Pty., Ltd.). August 8th, 1939. (531935.)

22967. "Electrical connectors." Carr Fastener Co., Ltd., and G. Wagstaff. August 9th, 1939. (531947.)

23035. "Lightning protection devices for wireless transmitters." F. C. McLean. August 9th, 1939. (531982.)

23103. "Multiple push-button switch." Soc. Industrielle Radio-Electrique. January 28th, 1939. (531991.)

23117. "Automatic volume control of radio receiving sets." General Electric Co., Ltd., and A. J. Biggs. August 10th, 1939. (531994.)

23132. "Light-measuring devices." Sangamo Weston, Ltd. January 14th, 1939. (531996.)

23143. "Constant-pressure gas turbines." Akt.-Ges. Brown, Boveri & Cie. August 16th, 1938. (531997.)

23233. "Centrifugal compressors." British Thomson-Houston Co., Ltd., and R. R. Huitson. August 11th, 1939. (532008.)

23235. "Resinous compounds." British Thomson-Houston Co., Ltd. August 13th, 1938. (532009.)

23308. "Electromagnetic devices." British Thomson-Houston Co., Ltd., August 12th, 1938. (532033.)

23309. "Electric circuit breakers and contacts therefor." British Thomson-Houston Co., Ltd. August 13th, 1938. (532034.)

23327. "Stranded electric conductors." Dubilier Condenser Co. (1925), Ltd. August 12th, 1938. (532036.)

23549. "Protective systems for electric circuits employing tap-changing arrangements." British Thomson-Houston Co., Ltd. August 17th, 1938. (532062.)

23550. "Elastic fluid generators." British Thomson-Houston Co., Ltd. August 17th, 1938. (532063.)

23551. "Thermostatic controls for the control of cooling or heating plants in buildings." Carrier Engineering Co., Ltd., and C. L. Sainty. August 15th, 1939. (532064.)

23556. "Thermionic valve circuits." Siemens Bros. & Co., Ltd., D. P. Long, C. L. Peters and L. S. Crutch. August 15th, 1939. (532066.)

23558. "Amplifying apparatus for electric communication systems." Siemens Bros. & Co., Ltd., and L. S. Crutch. August 15th, 1939. (532067.)

23559. "Electric communication systems." Siemens Bros. & Co., Ltd., A. Rosen and L. S. Crutch. August 15th, 1939. (532068.)

23573. "High-tension direct-current systems of the Greinacher type." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. August 15th, 1938. (532070.)

23593. "Electrical contacts." T. Bolton & Sons, Ltd., and W. E. Alkins. August 16th, 1939. (532073.)

23600. "Deflecting arrangements for use with cathode-ray tubes and the like." Baird Television, Ltd. and D. V. Ridgeway. August 16th, 1939. (532074.)

23623. "Sockets or holders for electrical lamps." P. S. Voronin. August 16th, 1939. (532078.)

23629. "Refrigerating apparatus." Westinghouse Electric International Co. September 2nd, 1938. (532079.)

23630. "Liquid immersed electric circuit interrupters." Westinghouse Electric International Co. September 8th, 1938. (532080.)

23631. "Frequency-discriminating electric network." Hazeltine Corporation. September 20th, 1938. (532081.)

23633. "Electron multipliers." M-O Valve Co., Ltd., and G. W. Warren. August 16th, 1939. (532082.)

23642. "Mercury-vapour generators." British Thomson-Houston Co., Ltd. August 17th, 1938. (532084.)

23714. "Electric lighting systems for electrically propelled vehicles." G. Matthews and Crossley Motors, Ltd. August 17th, 1939. (532089.)

23749. "Transmission mechanism for use in adjusting wireless receivers and for like purposes." Philips Lamps, Ltd. August 20th, 1938. (532139.)

23750. "Electric toasters." British Thomson-Houston Co., Ltd. August 17th, 1938. (532140.)

23751. "Methods of and means for removing defects in billets and the like." British Thomson-Houston Co., Ltd. August 17th, 1938. (532170.)

23752. "Electric conductors and method of manufacturing the same." British Thomson-Houston Co., Ltd. August 18th, 1938. (532141.)

23753. "X-ray inspection apparatus." British Thomsom-Houston Co., Ltd.(General Electric Co.). August 17th, 1939. (532142.)

23774. "Heat exchangers." Maschinenfabrik Oerlikon. August 27th, 1938. (532144.)

23814. "Electromagnetic relays." General Electric Co., Ltd., and J. E. Collyer. August 18th, 1939. (532147.)

23869. "Circuits for operating h.p.m.v. lamps." General Electric Co., Ltd., V. J. Francis, and K. G. Schnetzler. August 18th, 1939. (532160.)

23879. "Temperature controlling devices, particularly suitable for controlling the temperature of electric heating apparatus such as boiling plates." British Thomson-Houston Co., Ltd., and W. J. Sims. August 18th, 1939. (532171.)

23880. "Telephone transmitters." Standard Telephones & Cables, Ltd. October 6th, 1938. (532172.)

23881. "Four course beacons for radio navigation." Standard Telephones & Cables, Ltd. September 30th, 1938. (532173.)

23925. "Modulator circuits suitable for use in facsimile and like telegraph systems." Marconi's Wireless Telegraph Co., Ltd. August 31st, 1938. (532180.)

23965. "Electric cables." British Insulated Cables, Ltd., J. R. S. Orchard and H. B. Chapman. August 19th, 1939. (532185.)

23970. "Phase-shifting devices." British Thomson-Houston Co., Ltd. August 19th, 1938. (532186.)

24045. "Kinematograph projectors." Philips Lamps, Ltd. August 23rd, 1938. (532197.)

24047. "Cathode glow discharge tubes used as voltage controllers." Patent-Treuhand-Ges. für Elektrische Gluhlampen. August 23rd, 1938. (532198.)

24049. "Luminescent materials and combinations of luminescent materials with electric discharge devices." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Gluhlampen). August 21st, 1939. (532199.)

24060. "Gas-blast electric switches." British Thomson-Houston Co., Ltd. August 20th, 1938. (Addition to 524983.) (532201.)

24082. "Modulated carrier-wave transmission systems." E. K. Sandeman. August 21st, 1939. (532204.)

24143. "Method of separating steam in forced-flow tubulous steam generators." La Mont Steam Generator, Ltd. August 24th, 1938. (532210.)

24183. "Resinous compositions." British Thomson-Houston Co., Ltd. August 23rd, 1938. (532220.)

24184. "Electric dry rectifiers." British Thomson-Houston Co., Ltd. August 23rd, 1938. (532221.)

24255. "Steam generators." Superheater Co., Ltd., and E. A. Robinson. August 23rd, 1939. (532233.)

27457. "Electric cables." Pirelli-General Cable Works, Ltd., and J. R. Harding. October 9th, 1939. (5 32017.)

FINANCIAL SECTION

Company News. Liquidations and Bankruptcies. Stock Exchange Activities

Reports and Dividends

The English Electric Co., Ltd., proposes to pay a dividend on the ordinary stock for the year ended December 31st of 10 per cent. (2s. per £1 unit of stock), less income tax at 8s. 6d. (same). The preliminary statement shows a profit for 1940 (after providing for taxation) of £363,736, as compared with £355,656 for 1939.

The Yorkshire Electric Power Co. announces that its net profit for last year amounted to £652,092, as compared with £619,910 for 1939. The depreciation and reserve fund again receives £300,000 and £100,000 is reserved for war insurance (against nil); £50,000 (as compared with £100,000) is put to plant renewals fund. The ordinary dividend is maintained at 8 per cent. and £88,615 is carried forward (against £95,451). The report records the death of Mr. W. B. Woodhouse and the appointment of Col. H. C. Fraser as general manager. Sir Eugene Ramsden, Bt., M.P., was appointed to the board in the place of Mr. Osbert Peake. Continued progress is reported by the company and the North Lincolnshire & Howdenshire Co. The company, it is stated, is playing its part in the national effort, but detailed information cannot be given and for this reason the usual report of the company's annual meeting (which is to be held on Monday next) will not be published in the Press.

J. & E. Hall, Ltd., show a trading profit for the year to September 30th of £218,384, as compared with £209,398 in the preceding year, and a net profit of £65,841 (against £59,826). The ordinary dividend is again 8½ per cent., income tax requires £17,000 and £43,008 is carried forward (against £39,447 brought in).

The Rheostatic Co., Ltd., reports a net profit for the year ended September 30th, of £8,017, as compared with £19,015 for 1938-39. Reserve receives £2,000, and the ordinary dividend for the year is 10 per cent. (against 16 per cent.), leaving £4,196 to be carried forward (against £3,929 brought in).

J. & F. Stone Lighting & Radio earned net profits for the year ended June 30th of £61,546, as compared with £92,308 for 1938-39. A dividend of 5 per cent. is proposed on the ordinary shares, £6,518 is placed to preference share redemption fund, £30,000 is provided for taxes and £9,950 is carried forward (against £7,375 brought in).

The Electrical & Industrial Investment Co., Ltd., reports a gross revenue for 1940 of £52,585, as compared with £47,496 in the preceding year, and a net profit of £36,238 (against £30,398). The preferred and deferred dividends are maintained at 7 per cent. and 12 per cent. respectively, and £55,753 is carried forward (against £44,516 brought in).

Brilliant Signs, Ltd., is postponing the dividend on its 6 per cent. preference capital.

Clarke, Chapman & Co., Ltd., have again declared a dividend of 12½ per cent. for the year.

New Companies Registered

Ever Ready Electric Carbon Co. (1941), Ltd.—Private company. Registered January 29th. Capital £100. Objects: To carry on the business of manufacturers of, and dealers in, carbon, graphite, plumbago, clay or other refractory materials, carbon and bronze brushes, arc lamp carbons and all electrical carbon manufactured articles, etc. Directors: E. N. Rowbotham, 6, Woodcroft, Winchmore Hill, N. 21, and F. Lawrence, C.A., 90, Richmond Crescent, Highams Park, E. 4.

Tuskite Tube Manufacturing Co., Ltd.—Private company. Registered January 27th. Capital £700. Objects: To carry on the business of manufacturers of and dealers in bobbins, formers, bakelite, paxolin, paper and papier mache products, wireless, television and electrical machines, parts and components, metal workers, electrical, mechanical and general engineers, &c. Directors: A. J. Taylor, 406, Greenford Avenue, Hanwell; E. R. R. Chalk, 30, Dalkeith Grove, Stanmore; and P. Hamilton, 15, Park Lane, Hayes. Registered office: Factory Road, Uxbridge Road, Hanwell, Middlesex.

Lew Davis Products, Ltd.—Private company. Registered January 22nd. Capital £500. Objects: To carry on the business of wholesale and retail dealers in, and manufacturers of, radio and television sets, electrical equipment and various other goods. Subscribers: S. Sedgwick, 337, Strove Road, Manor Park, and H. A. Gordon, 1, Cedra Court, Cazenove Road, Stamford Hill. Secretary: Fredk. Dirs, 14, Langham Street, W.1.

Cardiff Welding Co., Ltd.—Private company. Registered January 28th. Capital £2,000. Objects: To carry on the business of electrical and general welding engineers, metal fusers, manufacturers of welding plant and equipment, mechanical, constructional and general engineers, manufacturers of, and dealers in, requisites for electric, oxy-acetylene and other welding, plating and depositing, etc. The subscribers are: E. Dolman, 19, Dumfries Place, Cardiff, and E. Ball, "Maes-y-ffynnon," Warren Drive, Caerphilly. Solicitors: Dolman & Sons, Cardiff.

Jigs & Tools (T. H. Price), Ltd.—Private company. Registered January 28th. Capital £100. Objects: To carry on the business of engineers, founders, manufacturers of jigs, press and machine tools, electric motors and appliances, electrical control gears, wireless apparatus, etc. Directors: T. Cornberg, 187, Bristol Road, Sparkbrook, Birmingham, and T. H. Price, 90, Elmdon Lane, Marston Green, Birmingham. Registered Office: 42, Vyse Street, Birmingham.

British Solenoids, Ltd.—Private company. Registered February 4th. Capital £1,000. Objects: To carry on the business of coil winders, instrument and machine tool makers, radio and component manufacturers, etc. Directors: D. de Laszlo, The Old Rectory, Little Bookham, Surrey and F. G. Cooke, 22, Pine Walk, Surbiton, Surrey. Registered office: The Old Rectory, Little Bookham, Surrey.

Solvar, Ltd.—Private company. Registered in Dublin January 30th. Capital, £1,000. Objects: To carry on the business of electrical engineers and contractors, dealers in and manufacturers of electrical goods and appliances, etc. Subscribers: P. Griffin, 116, Grafton Street, Dublin, and W. O'Sullivan, 36, Elgin Road, Ballsbridge, Dublin. Secretary (*pro tem*): H. Rice, 116, Grafton Street, Dublin.

Companies' Returns

Statements of Capital

Electric Development & Securities Trust, Ltd. — Capital £1,000,000 in 1,000,000 shares of £1 each. Return dated July 29th, 1940. All shares taken up. £476,890 10s. paid on 264,401 (£1), 149,986 (15s.) and 100,000 (£2). Premium £100,000 has been paid. £37,496 10s. considered as paid on 149,986 (5s. per share). Mortgages and charges: Nil.

Domestic Electrification, Ltd. — Capital £50,000 in 50,000 shares of £1 each. Return dated June 4th, 1940. 40,000 shares taken up. £40,000 paid. Mortgages and charges: Nil.

Siemens & General Electric Railway Signal Co., Ltd.—Capital, £20,000 in 10,000 "A" ordinary and 10,000 "B" ordinary shares of £1. Return dated July 4th, 1940. 3,500 "A" and 3,500 "B" shares taken up. £7,000 paid. Mortgages and charges, nil.

Electrical Engineers, Ltd.—Capital, £2,500 in 2,500 shares of £1 each. Return dated May 21st, 1940. 2,000 shares taken up. £700 paid. £1,300 considered as paid. Mortgages and charges: Nil.

Mortgages and Charges

Baily, Grundy and Barrett, Ltd.—Satisfaction in full on December 31, 1940, of debentures registered September 29, 1908, securing £2,700.

Receiver Released

Reeve Barlow, Ltd.—R. H. French, of 10, Ashley Place, Westminster, S. W. 1, ceased to act as receiver and/or manager on January 27th, 1941.

Liquidations

Strand & Interchangeable Signs, Ltd.—Winding up voluntarily. Liquidator, Mr. J. D. H. Sheridan. The liquidator is authorised to divide among the shareholders in specie all or any part of the assets of the company. All creditors have been or will be paid in full.

Basinghall Electric Co., Ltd.—Meeting pursuant to section 245 of the Companies Act, 1929, on February 28th at 6, Warwick Court, London, W.C.1, to receive an account of the winding-up by the liquidator, Mr. N. W. Osborne.

Bankruptcies

R. T. H. Brimfield (lately trading as Richfield Electrical Components), electrical contractor, 73-78 High Holborn, W.C.—This debtor attended at the London Bankruptcy Court on January 28th, before Mr. Registrar Parton for public examination upon accounts showing liabilities of £11,618 and assets "nil." Debtor stated that he started the above business in August 1939. He attributed his failure to unsuccessful transactions in masks for motor car head lamps and supplies of torches, and inability to carry through a building scheme. The examination was concluded.

K. H. Mullinger, electrician, 10, Pitman Avenue, Trowbridge, formerly carrying on business at the Radio Exchange Stores, King Street, Melksham, Wilts.—Last day for receiving proofs for dividend February 18th. Trustee, Mr. H. Wheeler, 26, Baldwin Street, Bristol, Official Receiver.

W. H. Grange (Talbot Electrical Co.), electrical engineer, 14, Plumstead Road, Thorpe Saint Andrew, Norfolk.—First and final dividend of 5½d. in the £ payable at Castle Chambers, Opie Street, Norwich.

STOCKS AND SHARES

TUESDAY EVENING.

FROM this week the Stock Exchange is to remain open until three o'clock in the afternoon on business days, an extension of one hour. During the last war it closed, throughout the greater part of the time, at three o'clock. Pious hope looks for such increase of business in Stock Exchange markets as will justify the extra hour which is now to be devoted to business, but, from the present appearance of markets in general there is little point in extending the time.

Prices keep steady. The news from Libya had a heartening effect, but restraint upon business activity is imposed by the widely-spread talk of invasion possibilities and the plain hints from responsible quarters of a coming increase in taxation. The demand for industrial shares of the better class continues fairly constant, though it is not so prominent a feature of the markets as it was a month ago. In most parts of the House, business is so quiet that, to quote an ancient saw, prices can almost be heard to fluctuate. Nevertheless, the record of daily transactions continues to be well above the 2,000 mark, from which it would appear as though there is more going on in the various markets than might be supposed.

Public Boards

The warning of Sir Kingsley Wood that fresh sacrifices would be called for in the next Budget has made no difference to the demand for "safety-first" securities. Investment takes all the stock which is offered, and then asks for more. In ordinary times, it might have been supposed that a fall in the price of the stock would follow such an announcement, for instance, as that made by the London & Home Counties Joint Electricity Authority, to the effect that the local Councils served by the Authority would be called upon to pay for street lighting only half as much as they pay annually in normal times. The arrangement is to continue during the war, subject to the right of the Authority to apply for a revision of the charges. The price of the 4½ per cent. stock remains at 105½ middle, at which the return is no more than 4¼ per cent.

West Midlands Joint Electricity Authority stock carries interest at 5 per cent. and also stands at 105½, at which the return is 4¼ per cent. on the money. Central Electricity Board issues and those of the London Passenger Transport Board are unaltered on the week.

Preference Shares Advance

To give a further idea of the demand which there is for safety stocks, we may mention that a firm of dealers in the Stock Exchange market issue a list of debenture stocks and preference shares of which they are buyers. In the debenture list, no fewer than 40 different securities are given, and in every case the amount stated is £5,000. The yields range from 3½ to 4½ per cent. on the money—returns that cannot be called extravagant in days such as these. Preference shares in the electricity supply companies are equally scarce; and, however dull other markets may be, it is generally the case that rises occur week by week in this particular section.

Ferranti 7 per cent. preference are better at 24s. 6d. General Electric 6½ per cent. preference have risen 1/8 to 32s. 6d., at which price they show the gilt-edged yield of 4 per cent. on the money. Tube Investments ordinary are 6d. lower, at 90s. 9d., but both classes of the company's shares show improvement at 32s. 6d.

Edmundsons' Interests

As already noted, the absorption by the Kent Electric Power Co. of two of the smaller Kentish electricity undertakings, is thought to prelude a possible amalgamation under one head of the various companies in which the County of London Electric Supply Co. has either a controlling interest or large shareholdings. Inquiry is being made as to whether other companies may be expected to follow along the same lines.

Edmundsons' Electricity Corporation stands out as being one of the foremost of those which controls electricity supply companies, being financially interested in about a hundred electricity supply undertakings owned by associated companies. Its principal investment is in the Shropshire, Worcestershire & Staffordshire Electric Power Co. Here the Edmundsons' interest amounts to a little over £3,000,000 in shares. Next comes the Wessex Electricity Co. in which Edmundsons' holds £2,983,000; and the third on the list is the South Wales Electric Power Co., in which the Edmundson holding is a little over £2,000,000.

Edmundsons' total investment in subsidiary companies is little short of £12½ millions, in addition to which it holds £1,283,000 of their debentures. The issued capital is £6¾ millions in ordinary stock, £400,000 in 7 per cent. preference and £1,513,685 in 6 per cent. preference, the dividends on the last two classes being cumulative. There is also outstanding about £4,000,000 in debenture stocks. In June, 1938, the company distributed 2,250,000 ordinary shares to its ordinary stockholders as a free bonus, in the proportion of one new share for two old. A liquid market is ensured to the ordinary shares by the large amount in issue, and attention was drawn here a fortnight ago to the holding of the Imperial Continental Gas Co. in Edmundsons'; a holding, which, as observed at the time, has shown Imperial Continental Gas stock to be now a domestic security.

Few Fluctuations

Prices in the electrical equipment and manufacturing group show few changes of note. Revo at 20s. and Reyrolle at 2½ are both 1/8 higher. International Combustion have gained ½ at 4¼: the loss of a similar fraction lowered Murex to 78s. 9d. Johnson & Phillips drooped to 46s. 3d. Hopkinsons are again better at 39s. 6d. After remaining at 3s. 9d. for many weeks, Brush ordinary have risen 3d. to 4s. None of these alterations can be said to possess any special significance. They represent the effect either of a little demand or an equal modicum of selling.

Electricity supply shares are featureless save for trifling declines to 27s. in British Light & Power, and to 21s. 3d. in City "Lights," the latter being due to anticipation of reduction in the usual dividend of 7½ per cent. for the past year. Cable and Wireless ordinary shed 2 points, to 53½, but Globe Telegraph & Trust ordinary are 1/8 up at 27s. 6d., inquiry being stimulated by talk of possible increase in the income-tax: dividends on Globe ordinary shares are paid, as a rule, free of tax.

British Electric Traction

The speculative investor has recently been paying unusual attention to the deferred stock of the British Electric Traction Company. This, at the price of £800, is regarded as something of a rich man's gamble, although the stock can be transferred in any amount. The smaller investor fights shy of it, however, owing to the relatively wide margin quoted in the price of the stock by dealers in the market. Having regard to the high price of the stock, a difference of 20 points between buying and selling prices is not so great as it appears, because, if the stock were to be quoted in units of £1, a 20 point margin would be no more than 4s. per share. Trust companies gave over £800 for the stock last month. Completion of their orders led to a natural reaction in the price; stock has recently been changing hands at 770 and thereabouts. At the Official List price of 800, the yield on the money comes to £5 12s. 6d. per cent. on the basis of the 45 per cent. dividend which it is assumed that the company will be able to continue. The various companies in which the B.E.T. is largely interested have been publishing unexpectedly good results. These drew attention to the holding company's deferred stock, and brought about the recovery from £400 at which it stood at one time last year, to the present figure. The 8 per cent. preferred ordinary stock is well secured, and at 150 gives a return of £5 6s. 8d. per cent.

Lancashire Dynamo

The recent rise in Lancashire Dynamo ordinary shares is due to belated recognition of the high return which the shares offer, on the basis of the last-paid dividend of 20 per cent. This was 5 per cent. less than the previous year's distribution but even so, at 52s. 6d., the present price, the return comes to over 7½ per cent. on the money. An interim dividend of 5 per cent. was paid last September; the final dividend for the year should be declared shortly. At the last meeting the chairman said that the company commenced 1940 with record order books. All the works were occupied with Government work or export trade. Unless greater supplies of raw materials were made available, he added, it was difficult to see how exports could be increased. Expectation looks for the dividend to be maintained at 20 per cent. The previous reduction was due to the incidence of increased taxation. The company's issued capital is £460,000, of which £400,000 is in ordinary shares of £1 each, the remaining £60,000 being in 5½ per cent. cumulative preference shares.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1940 Highest	1940 Lowest	Dividend previous	Dividend Last	Middle Price Feb. 10	Rise or Fall	Yield £ s. d.
Home Electricity Companies							
Bournemouth and Poole	63/6	36/6	15	15	47/6	..	—
British Power and Light	30/-	20/-	7	7	27/-	−6d.	5 3 8
City of London	28/-	20/-	7½	7½	21/3	−9d.	—
Clyde Valley	38/6	24/-	8	8	35/-	..	4 11 5
County of London	43/3	21/-	10½	10½	32/6	..	6 9 3
Edmundson's:							
7% Pref.	32/-	24/3	7	7	28/3	..	4 19 1
Ord.	27/6	18/6	9	6	24/6	..	4 18 0
Elec. Dis. Yorkshire	40/3	32/-	9	9	36/3	..	4 19 4
Elec. Fin. and Securities	42/-	34/6	12½	12½	40/-	..	6 5 0
Elec. Supply Corporation	48/-	39/-	12	11½	37/-	..	6 4 4
Isle of Thanet	16/-	5/6	4	4	6/-	..	—
Lancs Light and Power	33/-	21/6	7½	7½	28/9	..	5 4 4
Llanelly Elec.	21/-	17/-	5½	5½	19/-	..	5 15 9
Lond. Assoc. Electric	21/-	12/6	7	5½	13/9	..	—
London Electric	35/-	19/-	8	7	21/3	..	6 11 9
London Power Deb. Red.	105½	100	5	5	104½	..	4 15 6
Metropolitan	41/6	22/6	12	10	33/9	..	5 18 6
Midland Counties	39/-	23/3	8	8	35/9	..	4 14 10
Mid. Elec. Power	40/-	29/6	9	9	33/9	..	5 6 8
Newcastle Elec.	29/9	22/6	7	7	25/-	..	5 12 0
North Eastern Elec.:							
Ordinary	31/6	16/6	7	7	26/3	..	5 6 9
7% Pref.	32/6	25/6	7	7	30/-	..	4 13 4
Northampton	44/-	38/-	10	10	40/-	..	5 0 0
Notting Hill 6% Pref. (£10)	10½	9	6	6	9	..	—
Northmet Power:							
Ordinary	42/3	22/6	10	10	33/3	..	—
6% Pref.	29/-	23/-	6	6	28/-	..	4 5 9
Richmond Elec.	24/6	18/-	7	6	18/9	..	—
Scottish Power	38/-	24/-	8	8	34/6	..	4 12 9
Southern Areas	21/3	12/9	5	5	15/-	..	6 13 4
South London	23/3	20/-	7	7	20/-	..	7 0 0
West Devon	20/-	17/6	5	5	20/-	..	5 0 0
West Glos.	22/-	15/-	2½	4½	16/3	..	5 10 10
Yorkshire Elec.	40/-	23/6	8	8	35/-	..	4 11 5
Overseas Electricity Companies							
Atlas Elec.	4/-	1/3	Nil	Nil	2/-	..	—
Calcutta Elec.	37/-	22/6	10*	8*	35/-	−6d.	4 11 5
Cawnpore Elec.	30/-	24/-	10	10	27/6	..	7 5 6
East African Power	25/6	19/6	7	7	22/6	..	6 5 3
Jerusalem Elec.	24/-	15/-	7	7	21/3	..	6 11 9
Kalgoorlie (10/-)	12/6	9/6	7½	7½	12/-	..	6 5 0
Madras	26/9	21/6	8*	6*	25/-	..	—
Montreal Power	35½	30	1½	1½	31	..	—
Palestine Elec. "A"	25/-	10/-	5*	Nil	20/-	..	—
Perak Hydro-electric	20/3	13/-	2½	6	17/-	..	7 1 2
Shawinigan Power	27½	19	83cts.	90cts.	18½	..	—
Tokyo Elec. 6%	69	30	6	6	38½	..	15 11 8
Victoria Falls Power	75/9	56/6	15	15	72/6	..	4 2 9
Whitehall Investments Pref.	17/9	8/-	7½	7½	14/6	..	10 6 10
Public Boards							
Central Electricity							
1950–70	110½	104	5	5	109xd.	..	4 11 9
1955–75	112½	106	5	5	111	..	4 10 1
1951–73	107½	102	4½	4½	106	..	4 5 0
1963–93	96½	90	3½	3½	95	..	3 13 6
1974–94	91	79½	3½	3½	88½	..	3 13 5
London Elec. Trans. Ltd.	92	87½	2½	2½	93	..	2 15 9
London & Home Counties							
1955–75	113½	105	4½	4½	105½	..	4 5 4
Lond. Passenger Transport:							
A	116	104	4½	4½	111½	..	4 0 9
B	116	102½	5	5	106	..	4 14 4
C	65½	25	1½	1½	34	..	4 8 3
West Midland Joint Elec.							
1948–68	106½	103	5	5	105½	..	4 14 9
Telegraph and Telephone							
Anglo-Am. Tel.:							
Pref.	107	85	6	6	101	..	5 18 10
Def.	23½	18	1½	1½	23½	..	6 7 8
Anglo-Portuguese	22/6	10/-	8	8	15/-	..	10 13 4
Cable & Wireless:							
5½% Pref.	99½	66	4½	5½	95½	..	5 15 2
Ord.	65	27	4	4	53½	−2	7 9 7
Canadian Marconi $1	6/-	4/-	Nil	4cts.	5/-	..	—
Globe Tel. & Tel.:							
Ord.	32/6	21/6	7½*	6*	27/6	+½	4 7 3
Pref.	27/9	22/6	6	6	26/3	..	4 11 5
Great Northern Tel. (£10)	20	11	20	20	12½	..	—
Inter. Tel. & Tel.	5½	2½	Nil	Nil	3	..	—
Marconi-Marine	30/-	18/3	10	7½	22/6	..	6 13 3
Oriental Telephone Ord.	2⅞	45/-	12*	11½*	2⅜	..	4 16 10
Telephone Props.	15/-	11/-	6	6	11/3	..	10 13 4
Telephone Rentals (5/-)	9/6	5/3	10	10	7/3	..	18 0

Company	1940 Highest	1940 Lowest	Dividend previous	Dividend Last	Middle Price Feb. 10	Rise or Fall	Yield £ s. d.
Traction and Transport							
Anglo. Arg. Trams:							
First Pref. (£5)	4/3	1/-	Nil	Nil	2/-	..	—
4% Inc.	11½	2	Nil	Nil	6½	−2½	—
British Electric Traction:							
Def. Ord.	830	400	5	45	800	..	5 12 6
Pref. Ord.	169	130	8	8	150	..	5 6 8
Bristol Trams	48/6	32/6	10	8*	38/9	..	—
Brazil Traction	12½	5½	$1	50c.	7	..	—
Calcutta Trams	24/-	16/3	8	5½	19/-	..	5 15 4
Cape Elec. Trams	18/6	16/-	5	5	17/-	..	5 17 8
Lancs Transport	35/-	27/6	10	10	35/-	..	5 14 3
Mexican Light:							
1st Bonds	36	25	5		35	..	—
Rio 5% Bonds	95	74	5	5	85	..	5 17 8
Southern Rly.:							
5% Prefd.	79	35	5	5	49½	+1	10 2 0
5% Pref.	104½	59	5	5	87	..	5 15 0
T. Tilling	45/9	29/-	10	10	42/6	+½	4 14 0
Tilling & B.A.	47/6	41/9	9*	8*	44/6	..	—
West Riding	35/-	25/-	10	10	34/6	..	5 16 0
Equipment and Manufacturing							
Aron Electricity Ord.	17/6	10/-	15	Nil	16/-	..	—
Assoc. Elec.:							
Ord.	43/3	26/6	10	10	40/-	..	5 0 0
Pref.	36/6	32/3	8	8	35/-	..	4 11 5
Automatic Telephone & El.	47/3	32/-	12½	12½	45/-	..	5 11 1
Babcock & Wilcox	50/-	28/6	10	11	42/6	..	5 13 8
British Aluminium Ord.	56/-	29/-	12½	12½	42/-	−6d.	—
British Insulated Ord.	92/6	67/-	20	20	85/-	..	4 14 1
British Thermostat (5/-)	14/9	6/6	18½	18½	11/3	..	8 4 6
British Vacuum Cleaner (5/-)	12/-	4/9	40	12½	6/3	..	10 0 0
Brush Ord.	4/6	1/9	Nil	Nil	4/-	+3d.	—
Callender's	69/-	46/-	15	15	63/9	..	4 14 4
Chloride Elec. Storage	72/6	55/-	15	15	62/6	..	4 16 0
Consolidated Signal	72/6	59/-	36½	17	65/-	..	5 4 7
Crabtree (10/-)	24/9	17/6	17½	17½	22/6	..	7 15 7
Crompton Parkinson:							
Ord. (5/-)	20/-	12/-	30	20	18/9	..	5 6 8
E. K. Cole (5/-)	5/-	2/6	10	Nil	4/6	..	—
Elec. & Musical Industries (10/-)	10/3	4/3	5	Nil	7/9	−6d.	—
Electric Construction	36/3	27/6	13½	10	27/6	..	7 5 6
Enfield Cable Ord.	56/-	40/6	25	16½	50/-	..	6 10 0
Electrical Switchgear (10/-)	22/6	20/-	16	10	20/-	..	5 0 0
English Electric	33/9	16/6	10	10	30/-	..	6 13 4
Ensign Lamps (5/-)	15/3	12/6	25	25	15/-	..	8 6 8
Ericsson Tel. (5/-)	39/3	23/-	25*	25*	32/6	..	—
Ever Ready (5/-)	28/3	16/6	30	40	27/-	−3d.	7 8 2
Falk Stadelmann	18/3	12/6	6	7	14/6	..	9 13 2
Ferranti Pref.	25/-	22/-	7	7	24/6	+9d	5 14 3
G.E.C.:							
Pref.	32/6	26/-	6½	6½	32/6	+½	4 0 0
Ord.	83/3	53/3	20	20	79/3	..	5 1 0
Greenwood & Batley	25/6	20/-	15	13	20/-	..	13 0 0
Hall Telephone (10/-)	18/6	8/9	15	10	11/3	..	8 18 0
Henley's (5/-)	21/6	12/6	20	20	20/-	..	5 0 0
4½% Pref.	21/2	20/6	4½	4½	21/3	..	4 4 8
Hopkinsons	46/9	32/6	15	15	39/6	+9d.	7 12 0
India-Rubber Pref.	21/-	19/6	5½	5½	21/3	+½	5 3 6
Intl. Combustion	121/3	70/-	32½	30	43	+1	6 6 4
J. Lucas	60/6	40/-	15	15	53/9	..	5 11 6
Johnson & Phillips	50/9	32/6	12½	15	46/3	−½	6 9 10
Lancashire Dynamo	59/9	47/6	25	20	52/6	..	7 12 4
Laurence Scott (5/-)	11/-	6/-	15	15	7/-	..	10 14 2
London Elec. Wire	25/6	20/-	7½	7½	22/6	..	6 13 4
Mather & Platt	46/6	30/-	13½	10	37/6	+6d.	5 6 8
Metropolitan Elec. Cable Pf.	22/-	21/3	5½	5½	21/3	..	5 3 6
Murex	86/9	52/6	20	20	78/9	−½	5 1 9
Pye Deferred (5/-)	9/-	6/9	25	25	10/-	..	14 5 8
Revo (10/-)	20/9	11/6	17½	5	20/-	+½	2 10 0
Revrolle	60/6	41/-	12½	12½	50/-	+½	5 0 0
Siemens Ord.	23/9	15/6	7½	7½	20/-	..	7 10 0
Strand Elec. (5/-)	2/3	9d.	4	2	1/9	..	5 14 4
S. Smith (1/-)	8/-	3/6	37½	50	7/6	..	6 13 4
Switchgear & Cowans (5/-)	11/9	5/6	20	10	8/9	..	5 14 3
Telegraph Condenser (10/-)	8/9	6/3	5	..	7/6	..	—
Telegraph Construction	42/6	29/-	10	10	36/3	..	5 10 6
Telephone Mfg. (5/-)	9/-	5/-	9	9	7/-	..	6 8 7
Tube Investments	96/9	59/-	23½	23½	90/9	−6d.	5 5 9
Vactric (5/-)	3/6	2/-	4	Nil	2/3	..	—
Vickers (10/-)	22/-	9/6	10	10	15/3	..	6 11 2
Ward & Goldstone (5/-)	19/9	12/6	20	20	13/9	..	7 5 6
Westinghouse Brake	46/-	30/6	17½	10	41/3	..	4 17 0
Walsall Conduits (4/-)	26/6	17/6	55	55	26/3	..	8 7 8
West, Allen (5/-)	7/-	3/-	7½	10	3/9	..	10 0 0

*Dividends are paid free of Income Tax.

CONTRACT INFORMATION

Tenders Invited and Accepted. Schemes Promising Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Millbank, Westminster, London, S.W.1.

Belfast.—February 28th. Electricity Committee. Stores. (February 7th.)

East Grinstead.—February 24th. U.D.C. 11-kV outdoor type ring main units and 200-kVA outdoor type transformer. (See this issue.)

Leeds.—February 14th. Electricity Department. Stores for twelve months. (January 31st.)

London.—WANDSWORTH.—February 19th. Borough Council. Electric lamps. Particulars from Mr. R. H. Jerman, town clerk, Municipal Buildings.

Manchester.—February 27th. Electricity Department. Fire extinguishing equipment for switchgear, transformers, &c. (February 7th.)

Salford.—February 20th. Electricity Department. Stores. (February 7th.)

South Africa.—PRETORIA.—March 26th. City Council. Switchgear, transformers, reactors and auxiliary apparatus. (See this issue.)

PORT ELIZABETH.—March 13th. Municipality. One battery-driven tower wagon and one battery-driven van. (T. 15013/41.)*

Electric lamps and cable conduit. (T.15014/41.)*

Southern Rhodesia.—SALISBURY.—March 10th. City Electricity Department. 374 meters of various types. (T. 23645/40.)* Material for electrical distribution. (T.Y.15136/41.)*

Stores Department. March 28th. Electrically driven rendering vessel, etc., for municipal abattoir. (T.15135/41.)*

Tredegar.—March 6th. U.D.C. Surveyor's and Electricity Departments. Stores. (See this issue.)

Wakefield.—February 17th. Supply and erection of three-wire balancer for generating plant at Wakefield mental hospital. W.E.H. Burton, Victoria Chambers, Wood Street, Wakefield (P.O. Box 28).

Wolverhampton.—March 17th. Electricity Department. Paper insulated cables, compound and compounded insulating tapes (February 7th.)

Orders Placed

Barrow-in-Furness.— Electricity Committee. Accepted. Kiosk, etc. (£510).—Ferguson, Pailin.

Watch Committee. Electrical starters, heaters and trickle chargers at garage (£145).—T. Francis & Sons.

Birkenhead. — Electricity Committee. Accepted. High pressure oil testing set (£60).—British Thomson-Houston Co.

Blackburn.—Corporation Electricity Committee. Accepted. Electrode boiler (about £310).—Bastian & Allen.

Bury.—Town Council. Accepted. Electrical work for first-aid post.—S. Greenhalgh.

Cardiff. — Electricity Committee. Accepted. Cable boxes (£73), and additional equipment required to re-arrange the switchgear layout at power station (£1,859).—Metropolitan-Vickers Electrical Co.

Transport Committee. Accepted. Five miles of I.C.I. 4/0 round cadmium copper trolley wire (£1,169).—Llewellin Evans & Major. Five miles of 4/0 cadmium copper grooved trolley wire (£1,182).—B.I. Cables.

Chester. — Electricity Committee. Accepted. Cables for three years.—Callender's.

Chesterfield.—Electricity Committee. Accepted. Switchgear (£448).—Switchgear & Cowans.

Heston and Isleworth. — Electricity Committee. Accepted. Alterations to a 3,000 kVA transformer (£310).—Hackbridge Electric Construction Co.

Manchester. — Electricity Committee. Accepted. Replacement of superheater at power station.—Babcock & Wilcox. 33,000-volt neutral earthing switchgear.—Ferguson, Pailin. One 40,000-kVA transformer.—Ferranti. Relays for control of air-raid warning sirens.—Metropolitan-Vickers Electrical Co.

Mogden. — Middlesex C.C. Accepted. Earthing switchboard for pumping station (£125).—Lancashire Dynamo & Crypto.

Plymouth.—Electricity Committee.—Accepted. Steam and feed-water pipework, valves and auxiliary plant (£8,897).—Babcock & Wilcox. Boiler tubes (£719).—John Thompson Water Tube Boilers. Reinstatement works (switchgear).—Metropolitan-Vickers Electrical Co.; A. Reyrolle & Co.

Pontefract. — Town Council. Accepted. Electric pump at waterworks (£498).—Hathorn Davey & Co.

Preston.—Electricity Committee. Accepted. Switch house and switchgear.—English Electric Co.

Sheffield.—Electricity Committee. Accepted. Rectifiers with transformers and switchgear.—Electric Construction Co. (two at £2,600 each); Hewittic Electric Co. (one at £3,300).

Stoke-on-Trent. — City Council. Accepted. Maintenance of private telephones and radio equipment at Stallington Hall for twelve months.—Reliance Telephone Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Adwick-le-Street.—Extensions to offices, Bullcroft Main Colliery; Doncaster Amalgamated Collieries, Ltd., Doncaster.

Agher (County Meath).—Houses (5) for Irish Land Commission; M. Deegan, secretary, Upper Merrion Street, Dublin.

(*Continued on page* 380)

Roumanian Electrical Imports

Predominant German Participation

MANY branches of the electrical import trade of Roumania declined in 1939 but the set-back cannot be considered serious in view of the healthy advance which had taken place in most lines in 1938. The values of the principal items, together with the main supplying countries, are shown in the accompanying table, which is based on the official foreign trade returns issued in Bucharest. Notes of increases or decreases compared with 1938 have been added.

The United Kingdom has a very small share in the trade, Germany being predominant. Therefore the recent moves of the Reich to control Roumania's economic life do not make much change in the matter of electrical supplies. Under a new agreement between Germany and Roumania the Reich will supply the latter with agricultural machinery and equipment, together with technical and financial aid for railway, road and oil pipe-line construction. In 1939 the rate of exchange for the lei varied between 530 and 675 to the £.

	1939 Lei (000)	Inc. or dec. on 1938 Lei (000)
Dynamos, motors, convertors, transformers, fans, etc.—		
Total	221,700	+ 18,700
From Germany	146,800	+ 11,500
„ Switzerland	33,500	+ 15,300
„ Hungary	12,000	+ 1,700
Turbo-generators, dynamo-motor sets, and mercury rectifiers—		
Total	11,300	− 23,700
From Germany	6,900	− 20,800
„ Switzerland	3,600	+ 1,500
Electrical measuring and accessory instruments—		
Total	50,100	+ 8,100
From Germany	36,700	+ 5,700
„ Switzerland	5,100	+ 1,600
Distribution equipment, medical apparatus, etc., n.e.i., with winding—		
Total	127,600	+ 10,600
From Germany	101,600	+ 21,900
Ditto, ditto, without winding—		
Total	69,800	− 26,900
From Germany	43,700	− 20,200
„ France	16,000	− 6,000
Telephone, telegraph, signalling and bell apparatus—		
Total	97,500	− 68,500
From Germany	26,700	− 15,200
„ Belgium	43,700	− 43,300
Radio and electro-magnetic apparatus—		
Total	192,900	− 6,100
From Germany	95,000	− 9,000
„ Holland	61,900	+ 28,400
Domestic electrical appliances—		
Total	15,900	− 2,600
From Germany	10,200	− 100
„ United States	4,800	− 1,000
Accumulators—		
Total	3,690	+ 1,390
From Germany	1,800	†
„ Sweden	900	†
Wire and cable, rubber insulated—		
Total	16,000	− 7,500
From Germany	14,700	− 4,300
Ditto, enamelled—		
Total	8,100	− 2,600
From Germany	5,800	+ 2,200
„ Belgium	1,000	− 4,500
Ditto, metal-armoured—		
Total	156,000	+ 20,000
From Germany	68,400	− 3,800
„ Great Britain	81,900	+ 23,900
Insulating tubes—		
Total	5,400	− 6,500
From Germany	4,700	− 7,000
Electric lamps—		
Total	23,400	− 5,200
From Germany	8,000	+ 2,000
„ Hungary	14,700	− 5,300
Radio valves—		
Total	43,900	− 11,800
From Germany	10,800	− 2,600
„ Holland	9,500	+ 7,700
„ Hungary	11,300	+ 1,400
Carbons and electrodes—		
Total	19,300	+ 4,000
From Germany	17,900	+ 4,900

† Comparative figures not available.

Atcham.—Houses in rural districts for R.D.C. (£12,000); J. R. Sockett, engineer and surveyor, 24, St. John's Hill, Shrewsbury.

Barnsley.—Extensions to police and ambulance headquarters, St. Mary's Gate, for Watch Committee; H. Taylor, borough engineer, Town Hall.

Extensions to foundry; Wilson and Longbottom, loom machine makers, Nelson Street.

Barnsley.—Communal feeding and kitchen centres; H. Taylor, borough engineer, Town Hall.

Chesterfield.—Additions, Hippodrome, Corporation Street; Hippodromes, Ltd.

Coventry.—Guildhouse hostel for men for T.C. (£4,500); D. E. E. Gibson, city architect, 1A, Warwick Row.

Cumberland.—Senior School, Millom, for E.C.; J. H. Haughan, county architect, Alfred Street North, Carlisle.

Dewsbury. — School canteen, Ravensthorpe Council School, for E.C.; M. H. Forward, borough architect, Town Hall.

Donnington.—Police premises (£4,000); Shropshire county architect.

Durham.—Adaptation of Aykley Heads as auxiliary hospital for the C.C.; Dixon Elliott and Son, builders.

Epsom and Ewell.—Sludge pumping station, and other works, for main drainage scheme, for T.C.; Norman Auty, borough engineer, Town Hall, The Parade, Epsom.

Gildersome. — Additions, Moorhead Woollen Mills; H. Booth & Son, Ltd.

Gravesend.—Office extensions; E. A. and H. Sandford, Ltd.

Hemel Hempstead.—Slipper baths and alterations to building at Waterworks, for T.C.; borough engineer, Market Square.

Hendon.—Alterations, 381-395, Hendon Way; Johnson & Sons.

Hurst. — Hurst Hotel, Queen's Road; W. Postlethwaite, Cotton Tree Inn, Old Street, Ashton-under-Lyne.

Kidderminster.—Office, Trinity Lane; Carpet Trades, Ltd., Mill Lane.

Leyland.—Fire station for U.D.C. (£5,000); F. D. Howe, surveyor, Council Offices.

Luton.—Conversion of Modern School into hospital; F. Oliver, borough engineer, Town Hall.

Mansfield.—Works additions; Stokes Castings, Ltd.

Morley.—Works extensions; J. and S. Rhodes, Ltd.

Newcastle-on-Tyne.—Plant to deal with pig food (£3,000); P. Barr, city engineer, Town Hall.

Northenden.—Works additions for E. Wilcox & Co., Ltd.; A. A. G. Toone, architect, 19, Chapel Walks, Blackfriars.

Northwich. — Pump house and meter house at waterworks, for U.D.C.; F. L. James, water engineer, Council Offices, Church Road.

Penarth.—Adaptation of West House as Council offices (£2,500), for U.D.C.; surveyor, Council Offices.

Pudsey.—Improvement works, West Royd House, and Town Hall, for T.C.; borough engineer, Town Hall.

Purbrook.—Additions to junior Council School (£6,150), for Hants E.C.; county architect, The Castle, Winchester.

Saltcoats.—Church, Border Cross Roads; Church of Scotland Home Mission and Church Extension Committee.

Sittingbourne.—Houses (32), for Swale R.D.C.; surveyor, Council Offices, 48, Bell Road.

Stalybridge. — Canteen, Market Street, borough engineer.

Shrewsbury.—Canteens, Trinity Old Boys' and Girls' School, St. Mary's R.C., and Abbey C.E. Schools, for E.C.; borough engineer, Guildhall, Dogpole, Shrewsbury.

Stourbridge.—Community feeding and kitchen centres; G. N. Maynard, borough surveyor, Council House.

Sunbury.—Factory, 11, Thames Street; J. Archibald & Co., Ltd., button manufacturers, Wandsworth Road, S.W.8.

Sunderland.—Conversion of premises, Olive Street, to business premises; T. Ford, architect.

Swadlincote.—Community feeding and kitchen centre at West Street; G. S. Baker, surveyor, Council Offices.

Tamworth. — Communal feeding and kitchen centre at Peel Council School; J. L. Bleazard, borough surveyor, Town Hall.

Twickenham. — Additions; Automotive Engineering Co., Ltd., 104, The Green.

Tyldesley. — Extensions, Higher Green Lane, Astley; Tyldesley Co-operative Society, Ltd.

Wallsend-on-Tyne. — Communal feeding centres; J. A. Blench, borough surveyor, Town Hall, Wallsend.

Warrington.—Municipal cafés and children's canteens, for T.C.; borough surveyor, Bank Park.

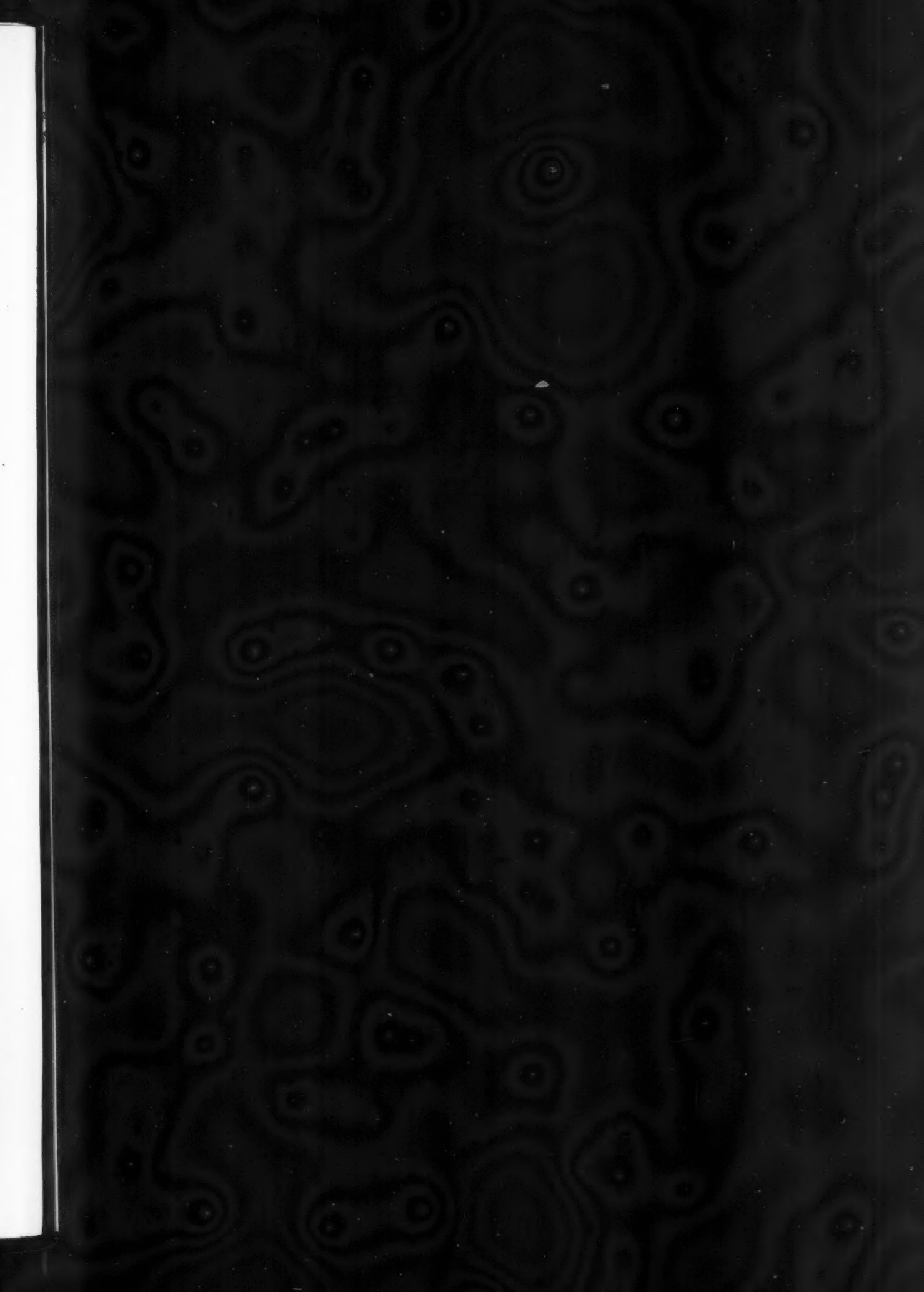
New Belfast Trolley Buses

A NUMBER of the 114 trolley buses ordered from the Associated Equipment Co., Ltd., by the Belfast Corporation Transport Department last year have now been completed and are due to go into service in the near future. The new fleet is composed entirely of three-axle vehicles embodying electrical equipment manufactured by the General Electric Co., Ltd.

The frame of nickel-steel has a maximum section of $11\frac{1}{4}$ in. deep and is inswept at the front to provide a small turning circle. All cross-members are tubular in order to minimise any distortion. The frame height from ground under full load is only 1ft. $10\frac{3}{4}$ in. A low floor-level has been obtained by mounting the motor behind the legal 10 in. ground clearance area. This also permits the adoption of a short, stiff propeller shaft, which has needle-roller bearing couplings. The G.E.C. compound-wound motor—type WT.26, rated at 105 HP on a one-hour rating at 550 V—has four-point flexible rubber suspension.

Three types of braking are employed—regenerative, controlled from the power pedal; rheostatic in conjunction with the air brake, controlled from the brake pedal; and the hand brake on the rear wheels. Chassis dimensions are: Wheelbase, 18ft. $7\frac{5}{16}$ in.; rear bogie axle centres, 4 ft. $0\frac{1}{2}$ in.; overall length, 29 ft. $7\frac{5}{16}$ in.; overall width, 7 ft. $5\frac{3}{4}$ in.; turning circle, 62 ft. 6 in.

The bodies, of which half have shells by Park Royal Coachworks, Ltd., and the other half by Metropolitan-Cammell-Weymann Motor Bodies, Ltd., are being completed by Harkness Coachworks, Ltd. They are of all-metal construction and designed to seat 68 passengers.

Lighting, which is divided into five equal circuits, would normally be obtained in both saloons through a maximum of 32 lamps in chromium-plated holders of thief-proof pattern. The vehicles are finished in the Belfast Corporation's standard livery of blue and white.

One of the new Belfast trolley buses, with a view of the interior